CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

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This chapter describes the Proposed Action and alternatives considered for the National Environmental Policy Act (NEPA) environmental impact assessment and details the differences among alternatives, providing a clear basis for choice among options by the decision-makers and the public. Comparison of the alternatives is based on the design of the alternatives and the environmental, social, and economic effects of implementing each alternative. **Section 2.7** presents the Agency-Preferred Alternative and the rationale used to select it. Alternatives or alternative elements considered but eliminated from detailed study are also discussed in **Section 2.8**.

Only reasonable alternatives need be considered in detail, as specified in 40 Code of Federal Regulations (CFR) 1502.14(a). Reasonable alternatives must be feasible, and such feasibility must focus on the accomplishment of the underlying purpose and need that would be satisfied by the proposed federal action. This Draft Environmental Impact Statement (Draft EIS) considers three alternatives:

- The Proposed Action
- The Rasmussen Collaborative Alternative (RCA)
- The No Action Alternative

After the discussion of the alternatives considered in detail, alternative elements considered but eliminated from detailed analysis are discussed briefly.

2.1 BACKGROUND

The Rasmussen Valley phosphate deposit addressed in this Draft EIS is located in Caribou County, Idaho, approximately 18 miles northeast of Soda Springs, Idaho (**Figure 1.2-1**). It is a portion of the phosphate-rich Meade Peak Member of the Permian-age Phosphoria Formation. In the Study Area, the Phosphoria Formation consists of chert, phosphatic mudstone, phosphorite, carbonaceous and cherty mudstones, and carbonate rock. In general, the thickness of the formation ranges from 250 to 450 feet at the Study Area location. The mineable phosphate rock occurs in two ore zones within the Meade Peak Member. About 60 to 100 feet of non-economic phosphatic shales separate the upper ore zone and the lower ore zone.

A federal phosphate lease that included the Rasmussen Valley deposit was originally issued to J.A. Terteling & Sons in 1955. Subsequently, the Lease was transferred to the Stauffer Chemical Company, then to the FMC Corporation in 1968, to Astaris Production LLC in 2000, and (most recently) to Agrium in 2004.

The Bureau of Land Management (BLM) and U.S. Forest Service (USFS) have prepared this Draft EIS to consider approval of Agrium's Proposed Action for mining on the Lease and the construction and operation of mine-related facilities outside the Lease. Agrium has submitted a Mine and Reclamation Plan (Agrium 2011) to the BLM for the development of this Lease that includes both on-lease and off-lease activities. This Draft EIS evaluates the impacts of the Proposed Action and alternatives to the Proposed Action to the human environment including impacts on area natural resources.

2.2 DISTURBANCE FROM PAST EXPLORATION

Exploration in the Rasmussen Valley deposit began in 1912 when the U.S. Geological Survey (USGS) excavated two exploratory trenches. Additional exploratory trenching occurred in 1948 as part of a study of the Western Phosphate Field. Exploratory drilling in the deposit has been conducted intermittently since 1969.

In 2008, Agrium began systematic exploration and conducted geotechnical boring and water monitoring as part of the planning and development for the Proposed Action. From 1969 through 2014, 166 documented exploration drill holes were completed in the Rasmussen Valley deposit. Precise locations and extent of exploration are not available for all of the early exploration, but all of the exploration activity over the years has disturbed approximately 28 acres of the Study Area.

2.3 PROPOSED ACTION

This description of the Proposed Action is a summary of Agrium's 2011 Mine and Reclamation Plan (Agrium 2011). The following sections describe proposed mining operations, management of water, the reclamation plan, environmental monitoring, and conceptual mitigation approach. They also discuss modifications to the Lease boundaries proposed by Agrium. The 2011 Mine and Reclamation Plan provides additional details.

2.3.1 Lease Modifications

Lease modifications have been proposed by Agrium to extend the current Lease boundary in three locations (**Figure 2.3-1**), specifically in portions of T7S R44E, Sections 6 and 9 totaling 171 acres. Exploratory drilling indicated that the phosphate deposit continued southeast beyond the currently defined Lease boundaries. To mine this area and maximize economic recovery, Agrium proposes to expand the lease boundary (Area B [125 acres], **Figure 2.3-1**) to include this area. The lease boundary would be modified in accordance with 43 CFR 3503.20.

The Proposed Action also proposes to place growth medium (GM) on National Forest Land outside the phosphate lease boundary. Agrium has proposed a lease modification (Area C [35.8 acres], **Figure 2.3-1**) for this area.

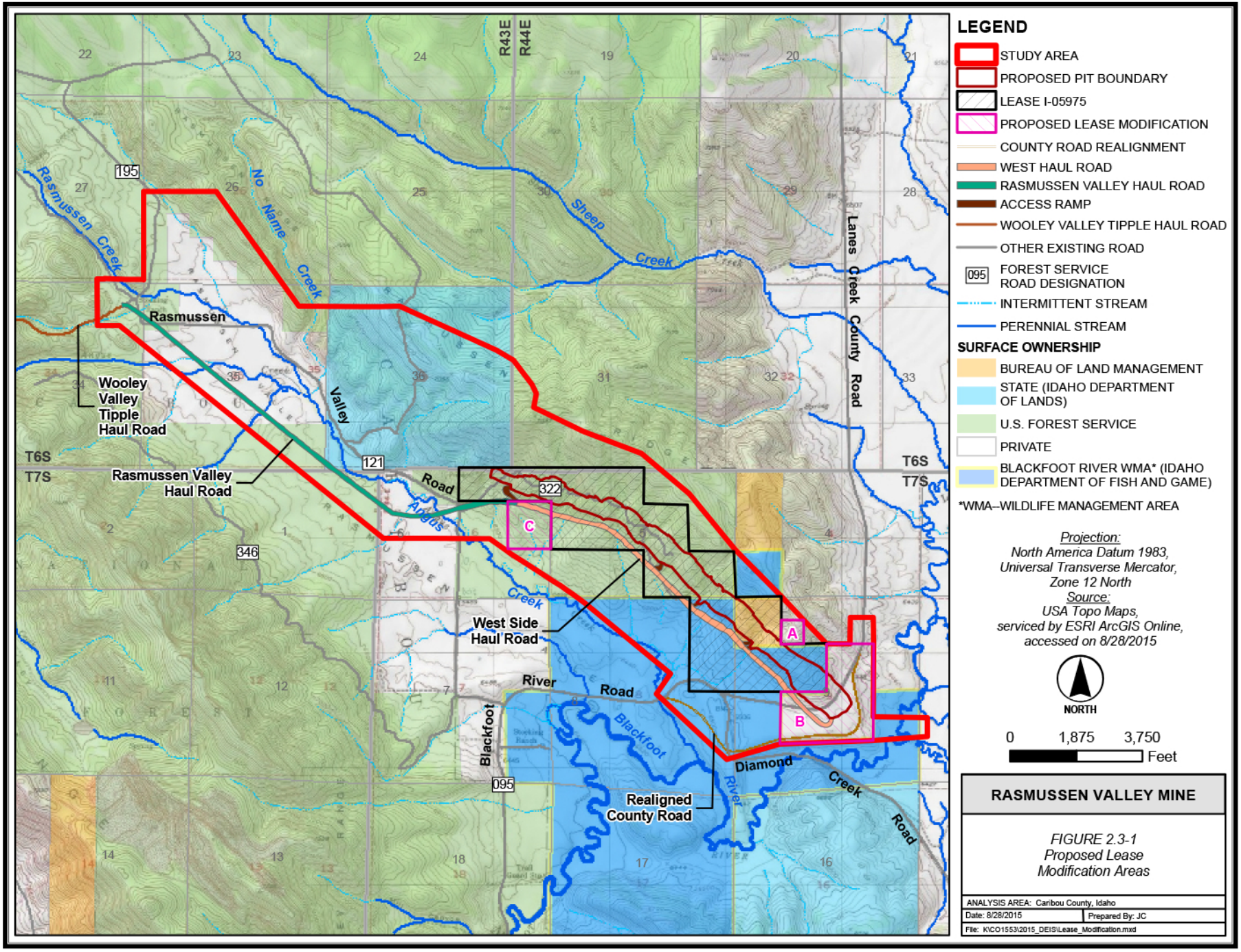
The Proposed Action also proposes a Lease modification (Area A [10.2 acres], **Figure 2.3-1**) to include a portion of the pit wall and backfill on private land.

2.3.2 Proposed Rasmussen Valley Mine

The Proposed Action consists of:

- The Rasmussen Valley Mine open pit would be developed in six sequential phases.
- Once the mining in each phase is completed, that phase would be backfilled using material from subsequent phases being mined.

Once a phase has been backfilled and shaped, it would be reclaimed (the concurrent backfilling as each phase is completed and reclamation are referred to jointly as concurrent reclamation).


LEGEND
STUDY AREA
PROPOSED PIT BOUNDARY
LEASE I-05975
PROPOSED LEASE MODIFICATION
COUNTY ROAD REALIGNMENT
WEST HAUL ROAD
RASMUSSEN VALLEY HAUL ROAD
ACCESS RAMP
WOOLEY VALLEY TIPPLE HAUL ROAD
OTHER EXISTING ROAD
095 FOREST SERVICE ROAD DESIGNATION
INTERMITTENT STREAM
PERENNIAL STREAM
SURFACE OWNERSHIP
BUREAU OF LAND MANAGEMENT
STATE (IDAHO DEPARTMENT OF LANDS)
U.S. FOREST SERVICE
PRIVATE
BLACKFOOT RIVER WMA* (IDAHO DEPARTMENT OF FISH AND GAME)
*WMA–WILDLIFE MANAGEMENT AREA
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 8/28/2015
NORTH
0 1,875 3,750
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.3-1
Proposed Lease
Modification Areas
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Lease_Modification.mxd
Rasmussen Creek
No Name Creek
Sheep Creek
Lanes Creek
County Road
Rasmussen
Wooley Valley Tipple Haul Road
Rasmussen Valley Haul Road
Valley Road
Angus Creek
West Side Haul Road
River Road
Blackfoot River
Diamond Creek Road
Realigned County Road
T6S
T7S
R43E
R44E
195
121
322
346
095
A
B
C

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- Two permanent external overburden piles would be developed and reclaimed downslope from the pit area and haul road and designated the North Overburden Pile and South-South Overburden Pile.
- Two permanent external overburden piles would be developed contiguous with and uphill from the pit and designated as the North External Overfill Pile and the South External Overfill Pile.
- Two temporary external overburden piles would be developed downslope from the pit area and haul road, including the South Main Temporary Overburden Pile and a portion of the North Main Overburden Pile.
- Two temporary overburden piles would be developed within the pit boundary, designated as the North and South Temporary Overburden Piles.
- A stockpile area could be optionally developed and reclaimed downslope from the pit area and haul road for temporary storage of ore or Meade Peak-containing materials as operational demands dictate and designated as the Ore Stockpile Area.
- Three GM stockpiles would be developed and reclaimed for use in reclamation activities.
- Access and haul roads would be constructed, operated, and reclaimed.
- Portions of the Blackfoot River, Lanes Creek and Diamond Creek County Roads would be permanently realigned and the abandoned road reclaimed.
- Temporary power lines would be constructed, operated, and reclaimed.
- A staging area would be constructed, operated, and reclaimed.
- Dust suppression supply, water quality monitoring, and water supply wells would be constructed, operated, and reclaimed.
- Surface water sediment controls would be constructed, operated, and reclaimed.
- A fuel storage area would be constructed, operated, and reclaimed.

Figure 2.3-2 shows the distribution of these facilities within the Proposed Action. **Table 2.3-1** lists the surface disturbances estimated for these activities. Agrium currently has approval to perform additional exploratory drilling within the Study Area before the Record of Decision (ROD) is issued. Based on the results of this additional exploratory drilling and potential changed conditions that might be encountered during mining, the areas to be disturbed and the quantities of material to be handled could minimally increase or decrease relative to what is shown in the table.

Agrium proposes to mine phosphate ore from the open pit and haul it by truck to their Wooley Valley Tipple. The pit would be mined in six phases, starting at the south end of the Proposed Action and progressing north. Ore would be mined using methods and equipment similar to those used at Agrium's Dry Valley Mine and Rasmussen Ridge Mines. From the tipple, ore would be hauled by rail on existing track to the Agrium Conda Phosphate Operations (CPO) fertilizer plant for processing. Agrium's other mining operations use the tipple, railroad, and CPO, and their use would be continued for the Rasmussen Valley Mine without change or modification.

The Proposed Action is designed to maximize recovery of the ore resource. Ore mining involves the removal of the available ore down to an economically feasible limit. This economic limit is based on mining capabilities, processing capabilities, costs, and ore value. It generally coincides with a pit depth that is at or below the "alteration floor." The alteration floor is the depth at which

less weathered or unaltered ore is encountered. Below the depth of the alteration floor, the unaltered ore typically is more difficult or prohibitively costly to process.

Table 2.3-1 Total Project-related Surface Disturbance from Proposed Action by Surface Ownership, including Areas Outside the Lease

Facility or Activity	Maximum Disturbance (acres)					
	Private	USFS	BLM	IDFG	IDL	Total[1]
Open Pit and Backfill[2]	22.6	102.2	27.4	43.2	0	195.4
Overburden and Overfill Piles	1.5	29.2	8.2	70.7	0	109.6
Optional Ore Stockpile	0	8.5	0	0	0	8.5
Haul Roads	23.0	38.3	1.3	14.9	0.4	77.9
Groundwater Monitoring Access Road	2.6	3.5	1.0	1.4	0	8.5
Facilities	0	1.4	0	0	0	1.4
Water and Sediment Control Structures	1.2	2.9	0	3.1	0	7.2
Realigned Portions of County Roads	3.1	0	0	3.0	0	6.1
GM Stockpiles	8.0	17.2	0	0	0	25.2
Total[1]	62	203.2	37.9	136.3	0.4	439.8

Notes:

1 Totals are based on more precise numbers (more decimal places) than are shown in the table, and because of rounding conventions, the totals may appear to be lower than the sum of the numbers in a row or column.

2 Total acreage includes temporary access ramps and also includes 11.2 acres of pit wall that would not be reclaimed.

IDFG = Idaho Department of Fish and Game

IDL = Idaho Department of Lands

2.3.3 Mining Operations

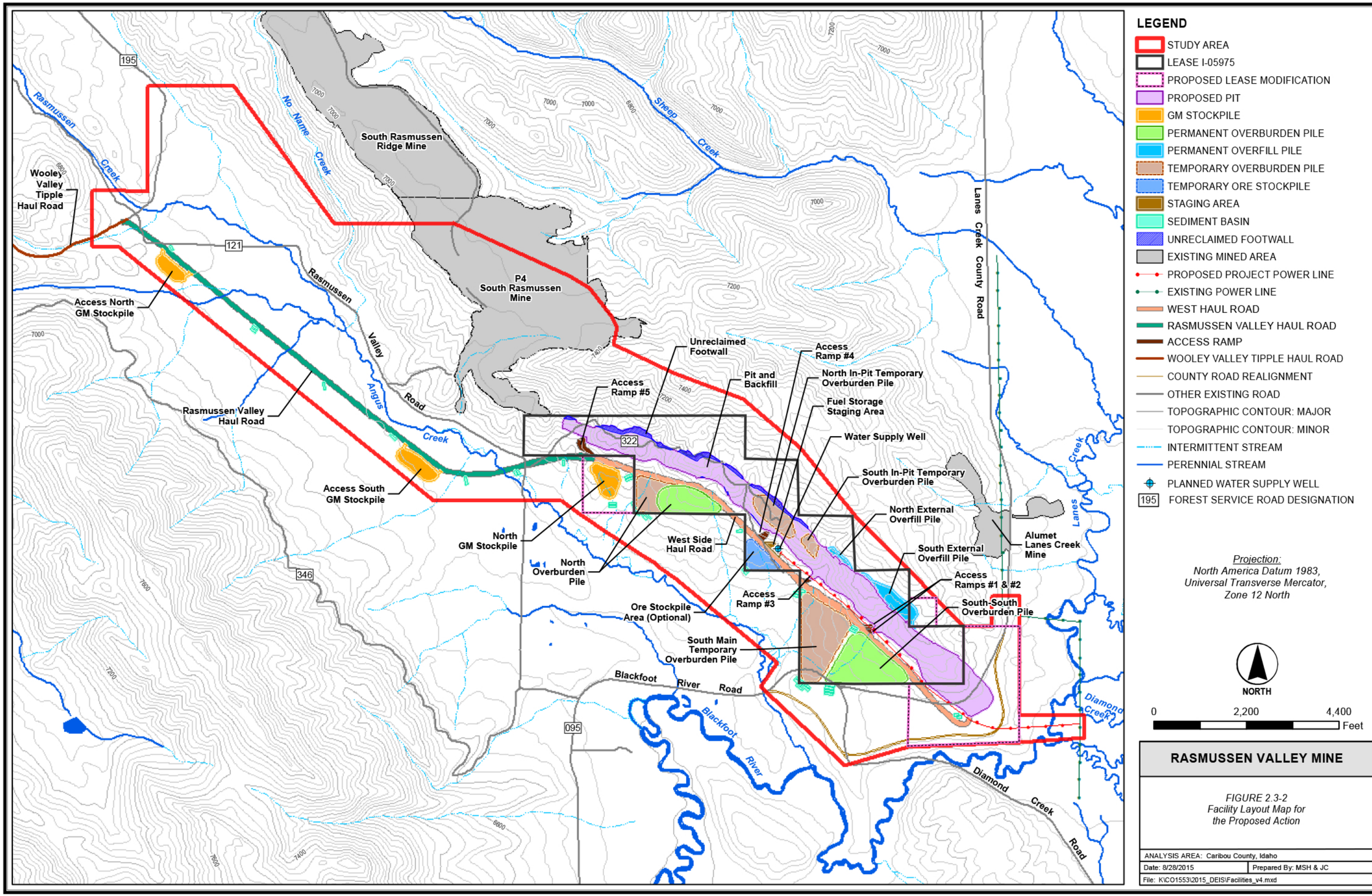
2.3.3.1 Mine Design

2.3.3.1.1 Mine Phasing and Reclamation

The deposit would be mined as an open pit in six phases (**Figure 2.3-3**). The pit would be mined from south to north over approximately 2.4 miles. The phases would range from about 1,500 to 3,500 feet long and average approximately 600 feet wide. The life-of-mine would be approximately 3.9 years, and the overall project duration (from stripping and infrastructure development through initial reclamation) would be approximately 5.8 years. Constraints on the pit's design include economic strip ratios; access requirements; slope stability assumptions and requirements; design restrictions such as slope angles, roads, and pit benches that may affect the pit's cross-sectional geometry for the ultimate pit design; and balancing phase volumes with available storage and backfill volumes.

The economic strip ratio and quality of the ore ultimately control the designed pit depth. Factors that control the economic strip ratio are cost to remove the overburden and estimated value of the phosphate ore. Costs to remove overburden are controlled by equipment costs, access, haul distances, and slope stability safety considerations.

The pit and backfill footprint of the six phases would disturb a total of 195.4 acres. As mining progresses, concurrent reclamation would start on the mined out areas using overburden material and GM from the newly mined area. Through progressive open pit backfilling, shaping and concurrent reclamation, the unreclaimed pit disturbance at any one time would be minimized.


LEGEND
STUDY AREA
LEASE I-05975
PROPOSED LEASE MODIFICATION
PROPOSED PIT
GM STOCKPILE
PERMANENT OVERBURDEN PILE
PERMANENT OVERFILL PILE
TEMPORARY OVERBURDEN PILE
TEMPORARY ORE STOCKPILE
STAGING AREA
SEDIMENT BASIN
UNRECLAIMED FOOTWALL
EXISTING MINED AREA
PROPOSED PROJECT POWER LINE
EXISTING POWER LINE
WEST HAUL ROAD
RASMUSSEN VALLEY HAUL ROAD
ACCESS RAMP
WOOLEY VALLEY TIPPLE HAUL ROAD
COUNTY ROAD REALIGNMENT
OTHER EXISTING ROAD
TOPOGRAPHIC CONTOUR: MAJOR
TOPOGRAPHIC CONTOUR: MINOR
INTERMITTENT STREAM
PERENNIAL STREAM
PLANNED WATER SUPPLY WELL
195 FOREST SERVICE ROAD DESIGNATION
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
NORTH
0
2,200
4,400
Feet
South Rasmussen Ridge Mine
P4 South Rasmussen Mine
Alumet Lanes Creek Mine
Wooley Valley Tipple Haul Road
Access North GM Stockpile
Rasmussen Valley Haul Road
Access South GM Stockpile
North GM Stockpile
North Overburden Pile
Ore Stockpile Area (Optional)
Unreclaimed Footwall
Access Ramp #5
Pit and Backfill
Access Ramp #4
North In-Pit Temporary Overburden Pile
Fuel Storage Staging Area
Water Supply Well
South In-Pit Temporary Overburden Pile
North External Overfill Pile
West Side Haul Road
South External Overfill Pile
Access Ramp #3
Access Ramps #1 & #2
South-South Overburden Pile
South Main Temporary Overburden Pile
Rasmussen Valley Road
Angus Creek
No Name Creek
Sheep Creek
Lanes Creek County Road
Blackfoot River Road
Blackfoot River
Diamond Creek
Diamond Creek Road
195
121
322
346
095
RASMUSSEN VALLEY MINE
FIGURE 2.3-2
Facility Layout Map for
the Proposed Action
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: MSH & JC
File: K\CO1553\2015_DEIS\Facilities_v4.mxd

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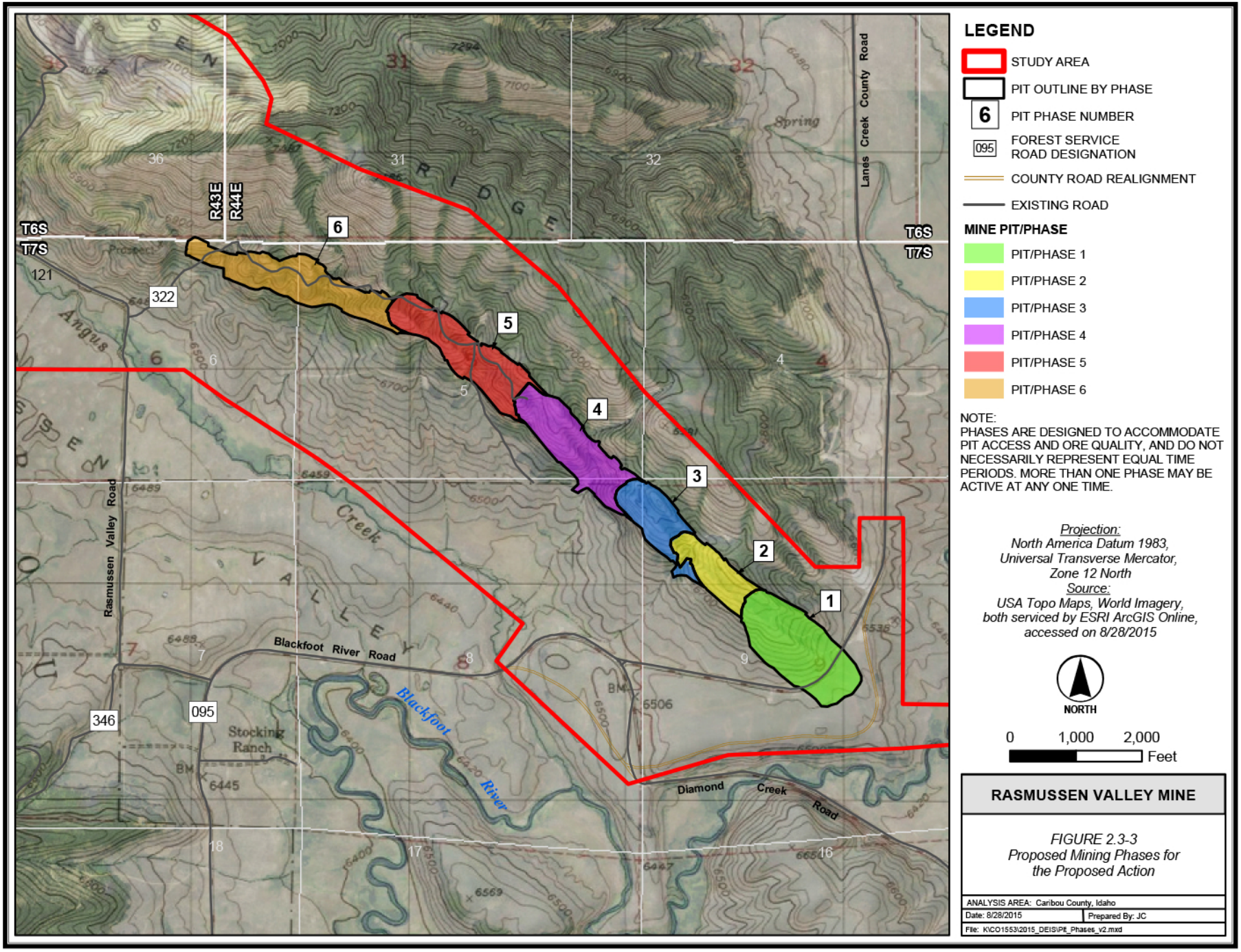
LEGEND
STUDY AREA
PIT OUTLINE BY PHASE
6 PIT PHASE NUMBER
095 FOREST SERVICE ROAD DESIGNATION
COUNTY ROAD REALIGNMENT
EXISTING ROAD
MINE PIT/PHASE
PIT/PHASE 1
PIT/PHASE 2
PIT/PHASE 3
PIT/PHASE 4
PIT/PHASE 5
PIT/PHASE 6
NOTE:
PHASES ARE DESIGNED TO ACCOMMODATE PIT ACCESS AND ORE QUALITY, AND DO NOT NECESSARILY REPRESENT EQUAL TIME PERIODS. MORE THAN ONE PHASE MAY BE ACTIVE AT ANY ONE TIME.
Projection:
North America Datum 1983, Universal Transverse Mercator, Zone 12 North
Source:
USA Topo Maps, World Imagery, both serviced by ESRI ArcGIS Online, accessed on 8/28/2015
NORTH
0 1,000 2,000
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.3-3
Proposed Mining Phases for the Proposed Action
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Pit_Phases_v2.mxd
T6S T7S
R43E R44E
Lanes Creek County Road
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
Stocking Ranch
Blackfoot River
Spring Creek
Angus
322
095
346
121

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The pit would be backfilled, capped with a minimum of 3 feet of non-Meade Peak-containing material, and covered with approximately 2 feet of GM. The cap and GM would be sloped to direct surface water off the reclaimed pit and onto native ground. No Meade Peak-containing materials would be left exposed. Upon completion of backfilling, pit wall exposures would remain in place above some portions of the backfilled pit.

During mining, a small road would be constructed along the crest of the pit to provide access to lighting stations and for pit wall inspections. This road would be approximately 20 feet wide to accommodate light vehicles and a dozer or equivalent. Trees, boulders, or other potential fall hazards into the pit would be removed during construction of this road.

2.3.3.1.2 Haul Roads

The ore haul road from the mine would be constructed approximately 2.3 miles along the southwest side of the pit (the West Side Haul Road) and approximately 2.4 miles across Rasmussen Valley (the Rasmussen Valley Haul Road) to the existing Wooley Valley Tipple Haul Road (**Figure 2.3-4**). The design of the Rasmussen Valley Haul Road minimizes curves and follows the most direct route between the mine pit and the Wooley Valley Tipple Haul Road. The proposed Rasmussen Valley Haul Road (identified in the alternatives as HR-1) would cross Rasmussen Valley County Road at two locations, cross Angus Creek at two locations, and cross three minor tributary drainages. This route would potentially disturb approximately 12.6 acres of wetlands.

The haul roads also would provide access to other mine facilities. The Wooley Valley Tipple Haul Road would provide access to the shop and maintenance facilities currently in use at the Rasmussen Ridge Mines. These facilities would remain operational for the duration of the Proposed Action. The West Side and Rasmussen Valley Haul Roads would connect mining operations in the pit with the staging area, GM stockpiles, overburden piles, and other mine facilities (**Figure 2.3-4**). Five access ramps (Access Ramps 1 through 5) would provide access to the active mining and backfilling areas from the West Side Haul Road. These ramps would be required throughout the life-of-mine to haul overburden, GM, and ore. Access ramps would be reclaimed concurrently with their associated pits, and new roads would be built as the sequence of mining progresses.

Widths of the haul roads would vary depending on location and localized physical constraints. Proposed Action haul roads not within the mine pit are designed with an 80-foot running width and a 10-foot safety berm on each side for a total width of 100 feet. This contrasts with the pit ramps, which have safety berms on only one side. The 80-foot running width allows for a running surface approximately 3.5 times the width of the haul trucks. On average, haul road disturbance widths adjacent to the mine pit (principally the West Side Haul Road) would be 140 feet. All of these roads would be constructed of non-Meade Peak-containing materials with fill side berms where necessary for safety. Culverts would be used to convey drainage ways under the haul road as described in the Surface Water Control Design Plan (Agrium 2011, Appendix F).

Access to the open pit would accommodate 150-ton capacity haul trucks. Initial ramp widths have been designed with 90-foot overall widths, allowing for a running surface and a safety berm. Ramps in the lower portions of the pit have been designed to be narrower where it is deemed reasonable to operate using one-way traffic. All ramps were designed at a maximum 10 percent gradient with the exception of areas close to the pit floor.

All roads located outside of the pit boundary have been designed to minimize surface impacts and ensure maximum efficiency and safety. Design features include:

- Road surfaces would be graded to minimize standing water.
- If necessary, large fill or cut slopes may be hydro-mulched, seeded, or otherwise stabilized to prevent excessive erosion from runoff.
- GM would be salvaged from the proposed road areas before construction and placed in stockpiles along the length of the road for use in reclamation.
- Best management practices (BMPs), such as sediment control fencing, straw wattles, and erosion mats, would be used to minimize impacts to surface water.

Surface water runoff reaching the haul roads and the relocated county roads from areas uphill would be conveyed under the roads through culverts or pipes. Culverts or pipes would be designed to pass a 50-year storm event in accordance with the Federal Lands Highway Project Development and Design Manual (FHWA 2014).

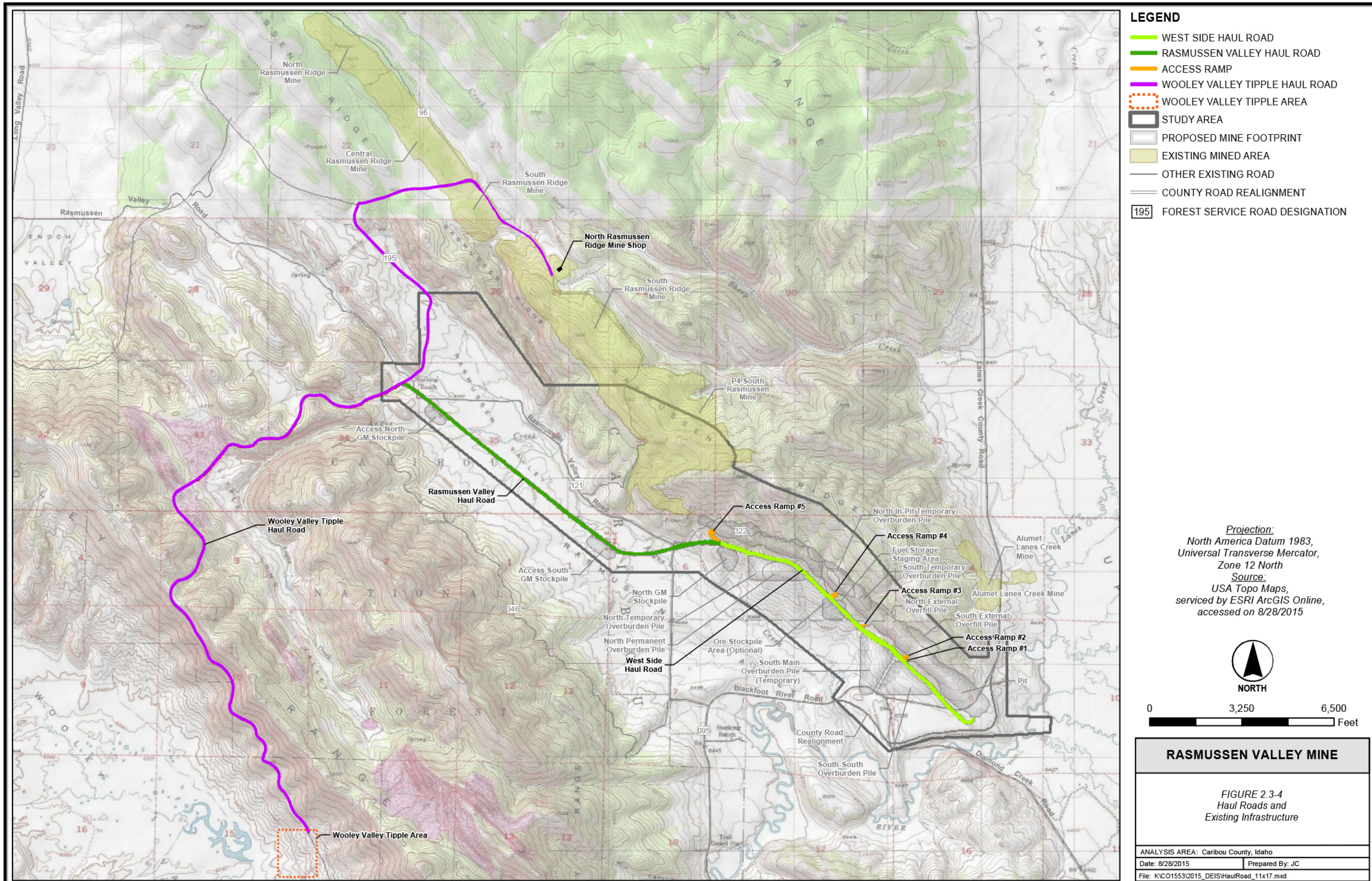
Agrium would use BMPs to control surface water runoff, sediment, and erosion from roads. These BMPs could include straw wattles, silt fencing, erosion matting, straw bales, brush barriers, diversion channels, berms, and sediment catchment basins. Specific measures would be identified in a site-specific Stormwater Pollution Prevention Plan (SWPPP).

2.3.3.1.3 Overburden and GM Management

Overburden mined from the Rasmussen Valley deposit would be placed directly in the pit as backfill, temporarily stored in external overburden piles for later use as backfill, or permanently stored in external overburden piles. Permanent external overburden piles that are contiguous with pit backfill and reclaimed with the backfill are called overfill piles. Most of the overburden mined from the pits would be transported directly from the active phase of mining to backfill the previous phases without being stored. Overburden would generally be placed directly in mined out phases, but some limited temporary storage may be necessary. Backfill would be placed in mined out areas by dumping at the pit crest and pushing into the pit by bulldozer or by dumping in lifts and spreading by bulldozer. Several factors would influence the decision on which method would be used for placing backfill in specific areas. They include the need for backfill ramps, the stability of the material as it is placed, availability of equipment to maintain truck-dumping areas, haul distance, haul grade, and stage of the backfilling process.

Several identifiable geologic layers or strata comprise the overburden that would be excavated from the mine pits. At various phosphate mines in Southeast Idaho, some of these strata express a potential for releasing higher concentrations of selenium and other constituents of potential concern (COPCs). Historically, in the Southeast Idaho Phosphate District, strata within the Meade Peak Member and certain strata within the Rex Chert Member geological formations have contained higher levels of selenium. Conversely, other strata express a lower potential for releasing selenium and other COPCs. Each mine also has its own unique profile of how much selenium and other COPCs are released based on the presence and ratios of the various strata. Consequently, the overburden material for each mine proposal must be evaluated independently.

Agrium's 2011 Mine and Reclamation Plan (Agrium 2011) uses the terms "seleniferous" material and "non-seleniferous" material to describe how Agrium proposes to segregate overburden for different disposal locations to lessen the potential for exceeding water quality standards for COPCs. In subsequent documents, Agrium replaced the term "non-seleniferous" with "low-seleniferous" to be more accurate because some of the materials slated to be placed in "non-seleniferous" overburden piles may contain some selenium or other COPCs that could be released.


LEGEND
WEST SIDE HAUL ROAD
RASMUSSEN VALLEY HAUL ROAD
ACCESS RAMP
WOOLEY VALLEY TIPPLE HAUL ROAD
WOOLEY VALLEY TIPPLE AREA
STUDY AREA
PROPOSED MINE FOOTPRINT
EXISTING MINED AREA
OTHER EXISTING ROAD
COUNTY ROAD REALIGNMENT
195 FOREST SERVICE ROAD DESIGNATION
North Rasmussen Ridge Mine
Central Rasmussen Ridge Mine
South Rasmussen Ridge Mine
North Rasmussen Ridge Mine Shop
South Rasmussen Ridge Mine
P4 South Rasmussen Mine
Access North GM Stockpile
Rasmussen Valley Haul Road
Wooley Valley Tipple Haul Road
Access Ramp #5
North In-Pit Temporary Overburden Pile
Access Ramp #4
Fuel Storage Staging Area
South Temporary Overburden Pile
Alumet Lanes Creek Mine
Access Ramp #3
North External Overfill Pile
Alumet Lanes Creek Mine
South External Overfill Pile
Access Ramp #2
Access Ramp #1
Access South GM Stockpile
North GM Stockpile
North Temporary Overburden Pile
North Permanent Overburden Pile
West Side Haul Road
Ore Stockpile Area (Optional)
South Main Overburden Pile (Temporary)
Pit
County Road Realignment
South-South Overburden Pile
Wooley Valley Tipple Area
Lanes Creek County Road
Blackfoot River Road
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 8/28/2015
NORTH
0 3,250 6,500 Feet
RASMUSSEN VALLEY MINE
FIGURE 2.3-4
Haul Roads and
Existing Infrastructure
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K:\CO1553\2015_DEIS\HaulRoad_11x17.mxd

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During their review, the Agencies (BLM, USFS, and Idaho Department of Environmental Quality [IDEQ]) determined that the terms “seleniferous” and “low-seleniferous” do not provide enough information to prepare an appropriately informative affects analysis and disclosure. In addition, the site-specific samples Agrium provided for each of the strata cannot be differentiated in accordance with this terminology. Consequently, the Agencies have taken a more descriptive approach to defining the overburden materials that would be segregated and placed in the different overburden piles and backfill.

Agrium proposed not to place Meade Peak strata, and potentially portions of the Rex Chert, in certain permanent external overburden piles. This would reduce the potential risk of selenium and other COPCs being released from these locations and exceeding surface water and groundwater quality standards. Overburden that does not include Meade Peak strata or specific Rex Chert material is referred to by Agrium as “low-seleniferous.” In the Draft EIS, these materials are referred to more descriptively as “non-Meade Peak-containing” material or “non-Meade Peak overburden”. Overburden that may contain Meade Peak or specific Rex Chert material, which is referred to by Agrium as “seleniferous” or SeW, is designated in this Draft EIS as “Meade Peak-containing” material or “Meade Peak overburden.”

Seven overburden piles would be used throughout the life-of-mine; three would be temporary and four would be permanent. The North Temporary and South Temporary Overburden Piles would be located inside the ultimate pit area near the Phase 5 area (**Figure 2.3-2**). They would be used for the temporary storage of overburden from Phase 1 mining. This material would be re-handled and placed into the backfill before Phase 5. The South Main Temporary Overburden Pile would be located outside the pit area (**Figure 2.3-2**), and would store Meade Peak overburden. All Meade Peak overburden from this pile would be re-handled into Phases 5 and 6 backfill areas.

The four permanent overburden piles (North, South-South, North External Overfill, and South External Overfill) would be composed of non-Meade Peak-containing material. The temporary portions of the North Overburden Pile would be re-handled into Phases 5 and 6 backfill areas. The North and South External Overfill Piles would be placed uphill from and contiguous with the pit backfill beyond the eastern (pit wall) pit crest. This placement would provide added disposal space that has a reduced risk of percolating water surfacing at the toe of the backfill, or impacting shallow groundwater. Estimated external overburden pile volumes, excluding stockpiled GM, are listed in **Table 2.3-2**.

In addition to the overburden piles, Agrium has designated an optional ore stockpile area for temporary storage of ore or Meade Peak-containing material, if necessary. This optional stockpile would be located between the North and South Main Overburden Piles immediately southwest of the staging area (**Figure 2.3-2**). This location would require a base of non-Meade Peak-containing material that does not release selenium or other COPCs at concentrations higher than acceptable levels. The base would have a level top surface and sideslopes of 3H:1V. Approximately 160,000 loose cubic yards of non-Meade Peak-containing material would be required to build the base for this stockpile area, should it be required. This stockpile would provide 177,000 loose cubic yards of temporary storage capacity.

During mining, Agrium would strip approximately 1,719,000 loose cubic yards of soils suitable for use as GM for reclamation. Three locations adjacent to the West Side and Rasmussen Valley Haul Roads would be used for stockpiling GM. They are the Access North GM Stockpile, Access South GM Stockpile, and North GM Stockpile (**Figure 2.3-2**). Stormwater would be diverted around the GM stockpiles where needed to prevent erosion, and runoff from the stockpiles would be diverted through temporary sediment basins.

Table 2.3-2 Estimated Volume Balances of External Overburden Piles and Backfill Locations

Overburden Pile	Capacity (loose yd^3)	Added (loose yd^3)	Removed to Backfill (loose yd^3)	Balance (loose yd^3)
North (Temporary)	1,589,000	1,443,000	1,443,000	0
North* (Permanent)	758,000	689,000	0	689,000
South Main	4,112,000	4,052,000	4,052,000	0
South-South	2,842,000	2,842,000	0	2,842,000
North Temporary	490,000	490,000	490,000	0
South Temporary	66,000	66,000	66,000	0
North External Overfill	61,000	61,000	0	61,000
South External Overfill	1,085,000	1,085,000	0	1,085,000
Total	11,003,000	10,728,000	6,051,000	4,677,000

Notes:

* On Figure 2.3-2, the permanent portion of the North Overburden Pile has a larger footprint than the temporary portion, but the capacity of the temporary pile is much greater than the permanent pile. This is because the temporary footprint partially overlies the permanent pile.

GM removed during construction of the access road and other infrastructure would be temporarily stored in the Access North and Access South GM Stockpiles. The Access North GM Stockpile would store approximately 331,000 loose cubic yards and occupy 8.0 acres. The Access South GM Stockpile would store approximately 347,000 loose cubic yards and occupy 8.6 acres. GM removed from the haul road, Phase 1, external overburden pile areas, and ancillary areas would be temporarily stored in the North GM Stockpile. The North GM Stockpile would contain varying amounts of GM over time and would occupy approximately 8.6 acres. GM removed during construction of the subsequent pit phases, in order of preference, would be either directly placed for concurrent reclamation or temporarily stored for later use in reclamation.

Mining operations would dictate the timing of the use of salvaged GM for reclamation. The preferred method is direct placement. If operational constraints do not permit direct placement, the salvaged GM would be temporarily stored before placement. The salvaging and placing of GM is a dynamic process; therefore, the stockpiles' volumes would be constantly changing. Over the life-of-mine, a cumulative total of approximately 1,103,000 loose cubic yards may be temporarily stored and removed from the stockpiles.

2.3.3.2 Ancillary Facilities

Ancillary facilities include an area to stage personnel and equipment, an area to store fuel, power lines or generators to provide electricity, and a well to supply water. The staging area is where miners would meet, receive operational instruction, and discuss safety items. A temporary structure at the staging area would contain restrooms and at least one emergency shower. The staging area also would provide storage and parking for emergency response and rescue equipment and vehicles. Finally, the staging area would have a "ready-line" for parking equipment that is not in use.

Fuel storage would be located near the staging area. Fuel would be dispensed at this facility directly or by fuel trucks dispatched from it. Fuel would be stored in multiple aboveground tanks.

The Proposed Action would require electrical power. This power would be supplied to the various facilities through power lines or generators. The ultimate source of electrical power would depend on the cost-effectiveness of the options available.

A well would be drilled to supply water for operations. Water from the well would be applied to haul roads and other areas to suppress dust from operations. In addition, water from the well would be used for emergency showers and restrooms at the staging area. The showers and restrooms would also require a septic system.

The Rasmussen Ridge Mines would be completing operations while operations at the Rasmussen Valley Mine were starting up, but the shop and maintenance facilities at Rasmussen Ridge Mines would remain open and be used for the Proposed Action. The shop and maintenance facilities would be accessed by way of the Wooley Valley Tipple Haul Road (**Figure 2.3-4**).

2.3.3.3 Mining Sequence

The mining plan was designed to maximize the recovery of the economic phosphate resource while maintaining acceptable environmental impacts. Factors affecting the maximal recovery of the phosphate resource include economic strip ratio, ore quality and cutoff grades, and the safe slope angle of the pit walls.

Mining would begin at the south end of the Rasmussen Valley deposit and move north. This sequence was developed with the following strategies to address issues and concerns:

- Complete backfilling, with the exception of some exposed pit wall, to limit visual impacts and to reduce potential environmental impacts to surface and groundwater.
- Maintain a connection between areas being mined and areas being backfilled to minimize backfill and concurrent reclamation haul distance.
- Reduce the extents and heights of pit walls.

Mining is divided into Phases 1 through 6 (**Figure 2.3-3**). Each phase was designed to allow construction of pit ramps for safe ingress and egress and provide available volume in previous phases to accommodate short haul distances for overburden disposal. Each phase would be from 1,500 to 3,500 feet long. Because no previous phase would be available for overburden disposal, most of Phase 1 would be mined, and the overburden placed in permanent external overburden piles or temporary overburden piles. Overburden of subsequent phases would be placed directly in previously mined phases. Mining would typically occur in concurrent multiple phases to allow blending to maintain an overall consistent quality of ore for processing, maintain the appropriate stripping ratio to ensure available space to dispose of overburden, and allow continuous operation of large excavation equipment in the wider upper portions of the pit while smaller equipment is mining the narrower, deeper portions of the pit.

New roads would be constructed or existing roads relocated as they are needed. The Rasmussen Valley Haul Road, connecting with the existing Wooley Valley Tipple Haul Road at the northwest end of the Study Area, and the West Side Haul Road ,along the west side of the Rasmussen Valley deposit, would be constructed at the beginning of mining. Portions of Lanes Creek and Diamond Creek County Roads and Blackfoot River Road would be relocated permanently at the beginning of mining to make room for the Phase 1 Pit and for the South-South and South Main Overburden Piles. Lanes Creek County Road, Diamond Creek County Road, and Blackfoot River Road would not be returned to their original locations after final reclamation because the post-mining topography of the pit backfill would require steep grades or side hill cuts in the backfill material that would be unacceptable for a county road.

A power line may be constructed from the existing power line southeast of the Proposed Action to the staging area unless generators are found to be more cost-effective. It may be constructed before mining begins or during the first stages of mining. If the power line is not constructed before mining begins, generators may be used until the power line is complete.

Non-Meade Peak overburden from mining Phase 1 would be used to construct haul roads. If necessary, it also would be used to build the base for the Optional Ore Stockpile Area. Ore would be stored on this area until the haul road is completed and ore could be hauled to the Wooley Valley Tipple directly. The remaining non-Meade Peak-containing material not used for constructing facilities would be placed either in the North or South-South Overburden Piles.

Meade Peak-containing material would not be used for constructing facilities. It would be placed temporarily in the South Main, North Temporary, or South Temporary Overburden Piles. Operational demands may at times require that Meade Peak overburden be stored temporarily in the Optional Ore Stockpile Area.

As mining proceeds into Phases 2 through 6, overburden from the current phase would be directly backfilled into previously mined phases. Non-Meade Peak overburden that would not fit into a previous phase would be permanently placed into an external overburden pile.

Agrium would generally salvage GM in the summer to fall, avoiding working in wet soil conditions. Wherever practicable, Agrium would use freshly salvaged GM for direct placement on areas being reclaimed. GM would be salvaged or stripped from a mining phase or area before mining. A minimum of 24 inches of GM would be used over backfilled areas. A minimum of 12 inches of GM would be placed over all other disturbed areas. The GM would be shaped to final configuration with dozers, graders, or other equipment before revegetation.

2.3.3.4 Mining Operations

The mine may be operated up to 24 hours per day year-round with overlapping shifts. Mining would occur using a series of 40-foot cuts with 30-foot-wide catch benches on the pit walls at every 80 feet of depth. Overburden would be either ripped or blasted to aid excavation depending on the hardness of the material. Blasting would be performed with ammonium nitrate-fuel oil (ANFO), blasting emulsions, or other standard blasting agents placed in drilled blast holes. Excavated material would be loaded into haul trucks and transported to the Wooley Valley Tipple, the Optional Ore Stockpile Area, previous phase pit, or external overburden piles depending on the type of material and available space.

2.3.4 Natural Resource Protection

The following paragraphs briefly address Agrium's proposals to protect natural resources, including surface water and groundwater, livestock and wildlife, cultural resources, wetlands, soils, vegetation, air, and fisheries and aquatic resources as part of the Proposed Action. Subsequent sections present discussions that are more detailed on overburden handling and management, water management, and reclamation.

2.3.4.1 Surface Water

The mining activities described in the 2011 Mine and Reclamation Plan have the potential to impact surface waters by introducing pollutants, such as sediment, selenium, and other COPCs, via stormwater runoff and spills and by surface runoff contacting exposed overburden. Agrium would design and implement BMPs to control erosion, sediment, and the release of COPCs to protect surface waters in and around the Proposed Action. In addition, Agrium would limit the

surface area of Meade Peak-containing material that would be exposed at any given time through direct backfilling and ensuring that a minimum cap thickness of non-Meade Peak-containing material (3 feet) and a minimum cover of GM (2 feet) are used over any backfill.

Control structures may be constructed before initiating each mining phase to intercept and divert surface water runon before it reaches the pit. Otherwise, runon water would enter the pit. The decision between these two options would be made by the operator based on safety and operational concerns. Control structures would include several types of designs to reduce or eliminate the risk of surface water contamination. Retention basins for runoff water and silt would be constructed at strategic locations before mining activities occur in the associated area to collect and contain water exposed to mining disturbances or overburden materials. Conveyance ditches constructed along the outer perimeters of the overburden pile and stockpile sites would convey surface water runoff from these sites to runoff retention basins.

2.3.4.2 Stormwater Pollution Prevention Plan

Agrium would implement a SWPPP in accordance with the National Pollutant Discharge Prevention and Elimination System (NPDES) program. The SWPPP would identify all potential sources of pollutants that precipitation could mobilize and transport to surface waters in or near the Proposed Action via runoff. The SWPPP would also outline the control measures and BMPs that Agrium would implement to prevent or reduce the discharge of pollutants in stormwater. As part of the SWPPP, Agrium would comply with U.S. Environmental Protection Agency (USEPA) and IDEQ requirements for monitoring storm-event-related surface water. The SWPPP would remain a living document throughout the life-of-mine and would accommodate changing mining operations through each mining phase.

2.3.4.3 Spill Prevention Control and Countermeasures Plan

Agrium would also implement a Spill Prevention Control and Countermeasure (SPCC) Plan to meet the requirements in Title 40 CFR 112. The SPCC Plan would be implemented before placement of any petroleum products on site and would be reviewed by Agrium's Spill Prevention Coordinator or other qualified personnel every 3 years. As required by regulation, the SPCC Plan and all subsequent amendments would be reviewed and certified by a Professional Engineer (PE).

2.3.4.4 Groundwater

Groundwater quality impacts from selenium and other COPCs are a concern at phosphate mines in southeast Idaho. Constituents mobilized by water from precipitation events, snowmelt, and other surface runoff events percolating through overburden storage piles and other mining features carry the potential to introduce selenium and other COPCs to groundwater. Agrium would protect groundwater resources by managing all material during the Proposed Action and through the implementation of BMPs designed to control infiltration and percolation into these materials.

2.3.4.5 Backfill

Backfill consists of overburden placed within the boundary of the pit crest. In general, Meade Peak-containing materials, along with other COPC-containing material and other overburden, would be directly backfilled into the open pits of previous phases once mining at those phases is completed. If any material were stockpiled, the residence time would be minimized to limit potential surface water infiltration. The backfilled Meade Peak-containing materials and other overburden would be covered with a minimum of 3 feet of non-Meade Peak-containing material

and 2 feet of GM. The cover is intended to limit precipitation and snowmelt infiltration, and reduce soil water that has infiltrated via evapotranspiration by reclamation vegetation. Diversion ditches would be installed above the pits and piles to intercept surface runoff originating uphill from these areas.

2.3.4.6 External Overburden Piles

The permanent external overburden piles were considered by Agrium to not have the potential to release COPCs into vegetation, groundwater, or surface waters because they would only contain non-Meade Peak overburden. Thus, they were not designed with a soil cover that purposely restricts infiltration and percolation.

2.3.4.7 Protection of Livestock

Agrium personnel would periodically visually survey the mine areas for livestock during normal mining activities. Livestock would be immediately removed from any areas of risk. Wildlife movement into or out of the Proposed Action would not be controlled.

2.3.4.8 Cultural and Paleontological Resources

Any significant cultural or paleontological resources identified at the Proposed Action by baseline surveys and during operation would be avoided and protected. If vertebrate fossils are exposed during mining, the locations would be recorded and, if possible, the fossil(s) may be provisionally classified. Notification would be provided to the BLM, State Historic Preservation Office (SHPO), landowner, or USFS depending on the location of the find. Any previously unknown cultural resource sites discovered during mining would be cordoned off and left as found until an appropriate agency or qualified representative can examine, document, and evaluate the find.

2.3.4.9 Wetlands and Riparian Areas

The development and mining of the Lease could disturb wetlands. Agrium would implement all necessary BMPs to minimize impacts to wetlands and riparian areas outside of the proposed disturbed areas.

2.3.4.10 Soil Erosion

Soil erosion would be controlled through the implementation of BMPs. BMPs may include, but are not limited to, straw wattles and sediment fencing to control water and soil movement from mining disturbances. Where appropriate, erosion matting would be used on haul road fill slopes to control soil movement into drainages. Brush barriers would be used to control runoff from overburden piles and GM stockpiles. Regular monitoring would be conducted to evaluate the effectiveness of the BMPs. If any BMPs are found to be inadequate, erosion control techniques would be adjusted to correct the inadequacy.

2.3.4.11 Existing and Reclaimed Vegetation

Existing vegetation would be protected to the extent practicable by limiting surface disturbance to those areas needed for operations. Concurrent reclamation would be employed. As soon as GM is removed from its original location, it would be placed directly atop reclamation areas if they are available. The immediate use of GM in reclamation promotes regrowth of vegetative matter and preserves existing seeds in the GM. Some GM would need to be stockpiled because reclamation areas would not always be available at the time that GM must be removed.

Agency-approved seed mixes that include native seeds would be applied. Two seed mixes would be used: one for drier sites and one for moister sites (**Table 2.3-3**). The reclaimed areas would be managed to control invasive and noxious species and prevent their introduction.

Table 2.3-3 Revegetation Seed Mixes

Southwest Aspects (drier sites)	Pounds per Acre	% of Seed Type	Northeast Aspects (moister sites)	Pounds per Acre	Percentage of Seed Type
Grasses			**Grasses**		
Bluebunch Wheatgrass	6.75	15	Mountain Brome	9.00	20
Western Wheatgrass	2.25	5	Bluejoint Grass	6.75	15
Great Basin Wildrye	4.50	10	Redtop Bentgrass	2.25	5
Idaho Fescue	4.50	10	Timothy	2.25	5
Mountain Brome	6.75	15	Pine Reedgrass	4.50	10
Big Bluegrass	4.50	10	Bluebunch Wheatgrass	6.75	15
Green Needlegrass	5.40	12	Slender Wheatgrass	4.50	10
Slender Wheatgrass	4.50	10	June Grass	4.50	10
Sterile Annual Rye (Quick Guard)	2.25	5			
Forbs			**Forbs**		
Western Yarrow	0.90	2	Western Yarrow	0.90	2
Lewis Blue Flax	0.90	2	Lewis Blue Flax	0.90	2
Brush			**Brush**		
Balsam Root	0.90	2	Mountain Snowberry	0.90	2
Bitterbrush	0.90	2	Cinquefoil	0.90	2
			Bitterbrush	0.90	2
Total	**45.0**	**100**	**Total**	**45.0**	**100**

2.3.4.12 Air Emissions and Noise

Project-related air emissions would predominantly consist of fugitive dust and combustion emissions from mining operations. Major sources of fugitive dust may include mining, drilling, blasting, material hauling, and traffic on the access and ore haul roads. Dust would be mitigated or minimized by the application of water or supplementary dust suppressants, such as magnesium chloride or calcium chloride, as necessary to seal roads chemically. Liquid dust suppressants would be used on all blast hole drilling operations.

Control of dust on haul roads is a safety concern as well as an environmental concern, especially during the dry season. If necessary, Agrium would install a water production well to ensure that the supply of water for dust suppression is adequate.

The layout of haul roads was designed to maximize haulage efficiencies and reduce combustion emissions. Steep grades and greater haul distances decrease haulage efficiency and increase combustion emissions.

2.3.4.13 Hazardous Materials and Wastes

Hazardous materials and wastes associated with the Proposed Action would be stored in the fuel storage area at the staging area and at the existing Rasmussen Ridge Mines shop area. The materials anticipated to be used at the Proposed Action and the wastes generated are listed in **Table 2.3-4**.

Table 2.3-4 Hazardous Materials Inventory

Material	Purpose for Use	Storage Location	Quantity Used/Day	On-Site Storage Quantity/Week	Waste Management
Diesel	Fueling heavy equipment	Staging Area and Rasmussen Ridge Mines Shop Area	10,000 gallons	37,120 gallons	Not Applicable
Gasoline	Fueling pickups and mechanics trucks	Staging Area and Rasmussen Ridge Mines Shop Area	100 gallons	3,000 gallons	Not Applicable
Solvents	Parts cleaning	Rasmussen Ridge Mines Shop Area	5 gallons	50 gallons	Spent Solvents Recycled Off Site
Used Oil	Used motor oil	Rasmussen Ridge Mines Shop Area	Varies	5,000 gallons	Used Oil Recycled Off Site
Antifreeze	Cooling for mining equipment	Rasmussen Ridge Mines Shop Area	100 gallons	8,000 gallons	Not Applicable
Used Antifreeze	Used antifreeze	Rasmussen Ridge Mines Shop area	Varies	2,000 gallons	Used Antifreeze Recycled Off Site
Mining Overburden	Phosphate ore recovery	Mine area	20,000 tons	120,000 tons	Not Applicable
Explosives-Emulsion	Overburden removal	Rasmussen Ridge Mines Shop Area	Varies	20 tons	Not Applicable
Kerosene	Fueling portable heaters	Rasmussen Ridge Mines Shop Area	Varies	2,500 gallons	Not Applicable
Methanol	Keeps air systems on heavy equipment from freezing	Rasmussen Ridge Mines Shop Area	Varies	110 gallons	Not Applicable

The Proposed Action would comply with applicable federal hazardous materials laws and regulations. They include the Resource Conservation and Recovery Act of 1976 (RCRA); the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or "Superfund"); the Superfund Amendments and Reauthorization Act of 1986 (SARA); the Clean Air, Clean Water, and Clean Drinking Water Acts; and other applicable federal and state laws and regulations.

All hazardous materials and wastes would be stored and shipped in appropriate containers and labeled according to the U.S. Department of Transportation regulations for hazardous materials as provided in 40 CFR Parts 171 through 180. Hazardous materials would be transported via regulated transporters. The primary route for transporting hazardous materials from Soda Springs to and from the mine would be via State Highway 34, Blackfoot River Road, and the existing haul road to the new West Side Haul Road to the mine site. Transportation of hazardous materials and wastes associated with the Proposed Action would comply with federal regulations.

The term "hazardous wastes" designates materials defined in 40 CFR Part 261.3 and regulated under RCRA. Hazardous wastes are regulated from the point of generation to the point of

disposal. The Proposed Action is anticipated to be a small-quantity generator because Agrium would generate less than 100 kilograms of hazardous waste per month.

2.3.4.14 Aquatic Habitats

Stream crossings would be constructed to maintain water flows at adequate depths to allow fish passage consistent with adjacent portions of the stream to mitigate potential impacts to existing fisheries and aquatic habitats. Sediment control BMPs would also be implemented to prevent sediment from entering the streams at crossings and other project areas with sediment release potential to streams.

2.3.5 Water Management

The goal of the surface water management system is to prevent exceedances of water quality standards. The methods proposed to obtain that goal for the Proposed Action are summarized in the following sections and are set forth in detail in Appendix F of the 2011 Mine and Reclamation Plan (Agrium 2011), Surface Water Control Design for the Rasmussen Valley Mine. Groundwater and surface water management in the pit is described below and summarized in the 2011 Mine and Reclamation Plan.

Small-scale amounts of water that accumulate in the pits from snowmelt, rain, or groundwater seepage and interfere with mining or create a workplace hazard would be pumped into a water truck and hauled for disposal on a backfill area that has yet to be covered and reclaimed. If any of the in-pit water were to be used for dust suppression, samples of the water would be tested for selenium and other COPCs before it is used. Runoff from the areas of applied dust suppression water would ultimately be contained in stormwater sediment basins and only released if testing found that the water met surface water quality standards. Water removed from open pits would not be discharged into surface drainages.

Snow that accumulates on Proposed Action roads and facilities areas would generally be plowed and stored in areas, such as along roadside berms or within reclaimed areas of the mine, that feed runoff into the various installed BMPs (such as silt fences) and sediment retention structures. This would ensure that surface runoff is kept within acceptable standards for sediments in surface waters. Hauling and handling of snow in areas identified as sensitive (e.g., near wetlands or stream channels) may be subject to other practices to avoid impacts to these areas.

If large-scale accumulations of water occur in the pit, pumps would be used to transfer water from the operational pit areas to unreclaimed backfill areas located below the pit crest where practical so that no surface water or sediment would leave the backfill area.

2.3.5.1 Surface Water Control Design

The goal of the Surface Water Control Design in the 2011 Mine and Reclamation Plan is to prevent exceedances of water quality standards. The following strategies would be employed to achieve that goal:

- Intercept and manage surface runoff.
- Manage runoff from the haul roads.
- Collect and manage runoff from overburden storage piles and GM stockpiles.
- Manage drainage at road crossings of natural drainages and streams.
- Re-establish pre-mining drainages after mining.

The objectives would be accomplished by constructing diversion structures, culverts, or ditches to collect water and divert it to mine pits or retention basins, or by constructing features such as culverts to convey natural drainages or streams under potential linear obstructions, such as haul roads or the county road.

2.3.5.2 Surface Water Control Structures

Agrium has designed surface water control structures to divert and handle surface runoff in the mine operations area. The structure design strategy, criteria, and results are included in the following sections.

2.3.5.2.1 Surface Runon

Surface runon in the Proposed Action occurs primarily from snowmelt. Interceptor ditches would be sized to accommodate this snowmelt. Surface water runon would be allowed to flow into the pits, and would be controlled as part of the mine dewatering plan included in the 2011 Mine and Reclamation Plan. Water removed from open pits would not be discharged into surface drainages. Interceptor ditches would be used for drainage areas 1 through 4 to reduce potential runon into Phases 2, 3, and 4 (**Figure 2.3-5**).

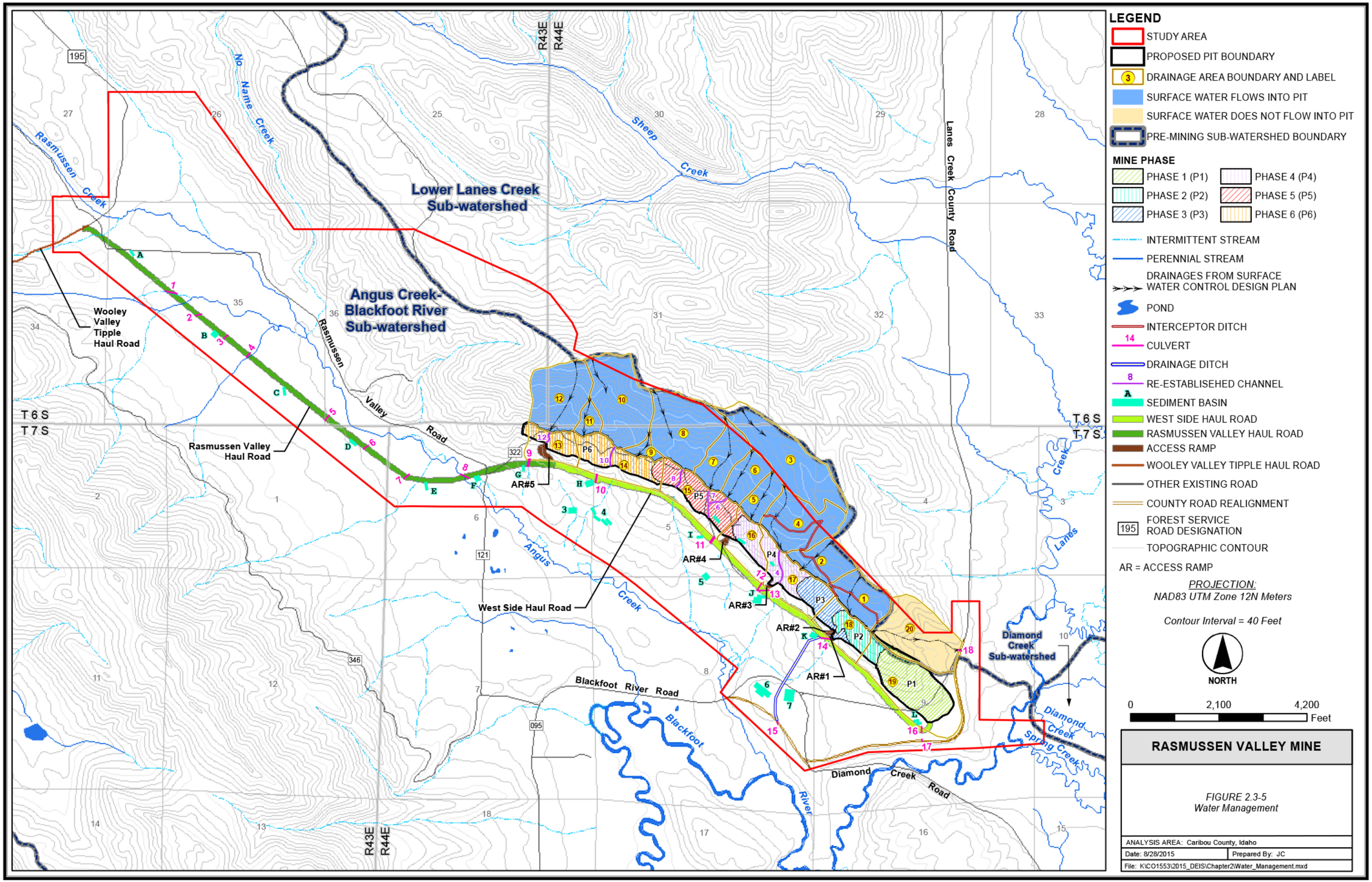
2.3.5.2.2 Runoff from Haul Roads

Culverts and ditches would be used to collect water from haul road surfaces and divert the water to sediment basins. The diversion structures and sediment basins would be constructed to hold runoff and prevent discharge of runoff that does not exceed the design storm rainfall event. Agrium's Multi-Sector General Permit (MSGP) allows for release of stormwater that meets water quality standards or exceeds the approved design storm event.

Runoff sediment basins A through L would be located downgradient of the West Side and Rasmussen Valley Haul Roads (**Figure 2.3-5**). Each runoff sediment basin designation may refer to a group of individual basins. **Table 2.3-5** lists the number of individual sediment basins and basin sizes for runoff sediment basins A through L, and the resulting excess capacity as a percentage of the total volume. The haul road runoff volume may include portions of the runoff from adjacent stockpiles.

Table 2.3-5 Haul Road Runoff Sediment Basins

Runoff Basin	Size	Road Length (ft.)	Runoff Volume (cu. ft.)	Number of Sediment Basins	Basin Volume (cu. ft.)	Excess Capacity (%)
A	50'x140'x10'	1,410	38,129	1	40,833	7
B	50'x135'x10'	2,784	75,284	2	78,417	4
C	50'x190'x10'	1,999	54,056	1	57,083	5
D	50'x190'x10'	1,995	53,948	1	57,083	5
E	50'x190'x10'	2,020	54,624	1	57,083	4
F	50'x120'x10'	2,393	64,711	2	68,667	6
G	50'x130'x10'	1,297	35,073	1	37,583	7
H	50'x180'x10'	2,082	102,650	2	107,667	5
I	50'x135'x10'	1,381	37,345	1	39,208	5
J	50'x180'x10'	3,486	152,578	3	161,500	6
K	50'x150'x10'	1,334	83,520	2	88,167	5
L	50'x115'x10'	1,991	61,515	2	65,417	6


LEGEND
STUDY AREA
PROPOSED PIT BOUNDARY
DRAINAGE AREA BOUNDARY AND LABEL
SURFACE WATER FLOWS INTO PIT
SURFACE WATER DOES NOT FLOW INTO PIT
PRE-MINING SUB-WATERSHED BOUNDARY
MINE PHASE
PHASE 1 (P1)
PHASE 2 (P2)
PHASE 3 (P3)
PHASE 4 (P4)
PHASE 5 (P5)
PHASE 6 (P6)
INTERMITTENT STREAM
PERENNIAL STREAM
DRAINAGES FROM SURFACE WATER CONTROL DESIGN PLAN
POND
INTERCEPTOR DITCH
CULVERT
DRAINAGE DITCH
RE-ESTABLISEHED CHANNEL
SEDIMENT BASIN
WEST SIDE HAUL ROAD
RASMUSSEN VALLEY HAUL ROAD
ACCESS RAMP
WOOLEY VALLEY TIPPLE HAUL ROAD
OTHER EXISTING ROAD
COUNTY ROAD REALIGNMENT
FOREST SERVICE ROAD DESIGNATION
TOPOGRAPHIC CONTOUR
AR = ACCESS RAMP
PROJECTION:
NAD83 UTM Zone 12N Meters
Contour Interval = 40 Feet
NORTH
0
2,100
4,200
Feet
Lower Lanes Creek Sub-watershed
Angus Creek-Blackfoot River Sub-watershed
Diamond Creek Sub-watershed
No Name Creek
Rasmussen Creek
Sheep Creek
Lanes Creek
Angus Creek
Blackfoot River
Diamond Creek
Spring Creek
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
County Road
Wooley Valley Tipple Haul Road
Rasmussen Valley Haul Road
West Side Haul Road
AR#1
AR#2
AR#3
AR#4
AR#5
R43E
R44E
T6S
T7S
195
322
121
346
095
RASMUSSEN VALLEY MINE
FIGURE 2.3-5
Water Management
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Chapter2\Water_Management.mxd

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2.3.5.2.3 Overburden Storage Piles and GM Stockpiles

Stockpile sediment basins and diversion structures are part of the water management plan (**Section 2.3.5**) and are designed to prevent or mitigate impacts to surface water resources. Runoff from overburden and GM stockpiles would be collected by perimeter ditches at the toe of each stockpile and routed to sediment basins. The perimeter ditches and runoff sediment basins would be constructed to hold and prevent discharge of runoff that does not exceed the design. Agrium's MSGP would allow for release of stormwater that meets water quality standards or exceeds approved design.

Six external overburden piles and three GM stockpiles are planned. Sediment basins are proposed for four of the six proposed external overburden piles and one of the three GM stockpiles. All the GM stockpiles would be stabilized with vegetation, straw wattles, and silt fences, and two of the three would not have associated sediment basins. The North and South External Overfill Piles are contiguous with and uphill from the pit backfill. Runoff from the North and South External Overfill Piles would be handled in the same manner as runoff from the pit backfill.

The runoff sediment basins for stockpiles are designed to hold 100 percent of the 100-year, 24-hour storm event. **Table 2.3-6** lists the specifications of the overburden piles and GM stockpile sediment basins to meet the design parameters.

Table 2.3-6 External Stockpile and Overburden Pile Sediment Catchment Basins

Basin #	Basin Name	Size	Runoff Volume (cu. ft.)	Number of Basins	Basin Volume (cu. ft.)	Excess Capacity (%)
3	North GM Stockpile	50'x180'x10'	81,581	2	82,292	1
4	North External Overburden Pile	50'x170'x10'	152,914	4	155,083	1
5	Rasmussen Valley Ore Stockpile (Optional)	50'x145'x10'	65,191	2	65,667	1
6	Main South External Overburden Pile	50'x205'x10'	231,931	5	235,417	1
7	South-South External Overburden Pile	50'x215'x10'	196,299	4	197,833	1

2.3.5.2.4 Drainage Control

Surface water would be conveyed under the Rasmussen Valley Haul Road, the West Side Haul Road, and the County Road realignment through culverts at 18 locations (**Figure 2.3-5**). Culverts 1 through 8 along the Rasmussen Valley Haul Road would direct drainages under the Rasmussen Valley Haul Road. Culverts 9 through 14 and 16, along the West Side Haul Road, would drain areas between the mine pit and the haul road. Culverts 15, 17, and 18 would direct drainages under the county roads. The runoff routed though these culverts would be from undisturbed drainages and would not be retained. Culverts under the haul roads and the county roads would follow the requirements of the Federal Lands Highway Project Development and Design Manual for high-standard roads on federal lands (FHWA 2014). **Table 2.3-7** lists proposed surface water drainage structures to be used during mining and reclamation. During reclamation, pre-mining drainage across the mine pit would be re-established along Drainage Channels 4, 6, 7, 8, 10, and 12 (**Section 2.3.6.5**).

Table 2.3-7 Surface Water Drainage Structures

Structure #	Project Stage	Location	Drainage	Design Basis
Culvert 1	Mining	Rasmussen Valley Haul Road	Angus Creek	100-year, 24-hour
Culvert 2	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 3	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 4	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 5	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 6	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 7	Mining	Rasmussen Valley Haul Road	Unnamed tributary	100-year, 24-hour
Culvert 8	Mining	Rasmussen Valley Haul Road	Angus Creek	100-year, 24-hour
Culvert 9	Mining	West Side Haul Road	Drainage 13	50-year, 24-hour
Culvert 10	Mining	West Side Haul Road	Drainage 14	50-year, 24-hour
Culvert 11	Mining	West Side Haul Road	Drainage 15	50-year, 24-hour
Culvert 12	Mining	West Side Haul Road	Drainage 16	50-year, 24-hour
Culvert 13	Mining	West Side Haul Road	Drainage 17	50-year, 24-hour
Culvert 14	Mining	West Side Haul Road	Drainage 18	50-year, 24-hour
Culvert 15	Mining	County Road realignment	Drainage 18	50-year, 24-hour
Culvert 16	Mining	West Side Haul Road	Drainage 19	50-year, 24-hour
Culvert 17	Mining	County Road realignment	Drainage 19	50-year, 24-hour
Culvert 18	Mining	County Road realignment	Drainage 20	50-year, 24-hour
Drainage Channel	Mining	Drainage 18	Culvert 14 to 15	100-year, 24-hour
Channel* 4	Reclamation	Pit 4	Drainage 4 to 17	100-year, 24-hour
Channel* 6	Reclamation	Pit 5	Drainage 6 to 15	100-year, 24-hour
Channel* 7	Reclamation	Pit 5	Drainage 7 to 15	100-year, 24-hour
Channel* 8	Reclamation	Pit 5	Drainages 8 to 15	100-year, 24-hour
Channel* 10	Reclamation	Pit 6	Drainage 10 to 14	100-year, 24-hour
Channel* 12	Reclamation	Pit 6	Drainage12 to 13	100-year, 24-hour

Notes:

* final reestablished channels

2.3.6 Reclamation Plan

The objectives of reclamation are to provide vegetative cover suitable to stabilize the surface; to reestablish the pre-mining multiple land uses of recreation, wildlife habitat, and livestock grazing where authorized; and to limit the risk of post-mining environmental impacts. Reclamation would consist of backfilling open pits, regrading backfill and overburden piles and haul roads, placing the cap and cover on backfill and overburden piles, handling GM, reestablishing drainage patterns, removing project-related facilities including power lines, and planting vegetation. Approximately 96 percent of the total disturbance would be reclaimed and revegetated. The remaining 4 percent would comprise unrevegetated pit walls exposed in pits not backfilled crest-to-crest and unreclaimed portions of the realigned county roads.

2.3.6.1 Backfill

Approximately 89 percent of overburden excavated during the life-of-mine would be either returned to the open pits as backfill or placed in the two external overfill piles, which are contiguous with the pit backfill. The remaining excavated overburden would remain permanently in two external overburden piles. All Meade Peak-containing material would be backfilled directly into the previous phase open pits or external overfill piles. When backfill space is not available,

material would be stored temporarily in external piles until it can be placed in appropriate backfill locations.

All of the backfill in the mined pit would be shaped so that runoff could drain across the pit crest and off the pit backfill surface. A small area of unreclaimed pit wall (11.2 acres) would be left exposed. No Meade Peak-containing materials in the pit walls would be left exposed. Material from the initial mining of Phase 1 would be transported to the temporary and permanent external overburden piles and to the two temporary overburden piles located within the pit footprint (**Table 2.3-1**). As mining progresses, open pits would become available to receive excavated overburden from the subsequent mining phase as backfill.

Phases 1 through 5 and a portion of Phase 6 would be backfilled to a final reclaimed surface slope of no more than 3H:1V. The remainder of Phase 6, the last phase to be mined, would be backfilled to a final reclaimed surface sloping northeast-to-southwest at a 2 percent gradient. Runoff would flow off the backfilled areas across the western pit crest toward reestablished drainages. The slope of the backfill reduces the risk of collecting standing water or a pit lake.

2.3.6.2 Cap and Cover

The Proposed Action cover system is a store-and-release soil cover consisting of 2 feet of GM salvaged from within the pit over 3 feet of non-Meade Peak-containing material. Store-and-release covers rely on reducing the percolation rate of infiltrated water in the soil to allow plant roots time to transpire the water into the atmosphere. The Proposed Action cover is designed to reduce the percolation rate in the root zone until a portion of the water can be released to the atmosphere through evapotranspiration. The non-Meade Peak-containing layer separates the underlying Meade Peak-containing material from the GM, while the GM supports vegetation. This cover system is proposed to limit the amount of net percolation of meteoric water and allow moisture storage in the cover to be available for plant uptake and evapotranspiration. No Meade Peak-containing materials on the pit walls would be left exposed.

2.3.6.3 Overburden Piles

The final slopes of external overburden piles would be graded or re-contoured to have maximum 3H:1V slopes and to eliminate ponding of meteoric waters thus reducing infiltration. The final height of the permanent overburden piles would range from 180 feet to 260 feet high from toe to top. The South Main Temporary Overburden Pile and a portion of the North Overburden Pile would be placed back into the pit as backfill at the end of mining. The permanent external overburden piles would not include Meade Peak-containing material. When the permanent external overburden piles were final graded, they would be covered with a minimum of 12 inches of GM and revegetated.

2.3.6.4 GM Direct Placement and GM Storage Management

GM direct placement and storage management are common elements of the 2011 Mine and Reclamation Plan. The placement strategy for GM is to collect and place GM on available areas or to store GM in stockpiles for use as soon as feasible for reclamation, thereby avoiding long-term GM storage. GM would generally be collected during the summer and fall when wet or frozen soil conditions do not restrict soil salvage operations.

2.3.6.5 Re-establishment of Drainages

All of the drainage areas would be reestablished after mining. Six of these drainages (4, 6, 7, 8, 10, and 12; **Table 2.3-7**) would be reestablished with channels lined with compacted GM or alluvium and riprap. The remaining six drainages are small and would be reestablished by final grading contours.

The six reestablished channels would be designed to accommodate the peak discharge from the 100-year, 24-hour storm event with a minimum of 6 inches of freeboard (**Table 2.3-7**). The channels would be constructed as flat-bottomed, trapezoid-shaped channels with a bottom width of 8 feet and 3H:1V side slopes. Channel depths would vary depending on the design peak flow. The channels would be lined with a layer of compacted alluvium or GM to reduce infiltration into backfill, then lined with riprap as needed to reduce erosion. The slopes of the channels would vary with the ground slopes of the backfill at the time of channel construction.

2.3.6.6 Haul Roads

The West Side Haul Road, the Rasmussen Valley Haul Road, and smaller connecting roads in the Proposed Action would be reclaimed when no longer needed. The existing Wooley Valley Tipple Haul Road would be reclaimed under the Rasmussen Ridge Mines Reclamation Plan when no longer needed.

All reclamation would be designed to meet the vegetation COPC concentrations established in the BLM Pocatello Field Office (PFO) Approved Resource Management Plan (ARMP) (BLM 2012). For all haul roads, the first stage of road reclamation would be to remove safety berms as necessary, particularly in areas of potential selenium contamination. Haul road material that is removed would be placed as backfill within the mine. Road material would be removed beginning with the outside edges and working inward to the centerline. Maximum practical effort would be made to not increase the cross-sectional footprint of the road during reclamation. Reshaping of the road would leave a reclaimed surface that has maximum slopes of 3H:1V, with the edges blending into the natural topography and having no ledge where the reclaimed edge meets the original grade. Reshaping would be achieved by removal of material to the specified dimensions and contours, not by spreading material out beyond the original disturbance area. Once shaped, all reclaimed surfaces would be covered with a minimum of 12 inches of GM and revegetated.

Haul road culverts and all road fill materials overlying the culverts would be removed. A minimum of 8 feet of fill on either side of the original drainage would be removed. GM would be placed in areas where it had been removed for haul road construction. BMPs would be implemented to address erosion until vegetation is reestablished. Any associated nearby water management structures, such as sediment ponds, would also be reclaimed as part of haul road reclamation. Water management structures would be cleaned of any materials potentially containing selenium or other COPCs before the originally excavated materials are used to fill the structures. Any Meade Peak-containing material from haul roads, berms, or water management structures would be disposed of as backfill within the mine.

2.3.6.7 Facilities

After mining, all equipment and facilities would be removed from the site. The drinking water system and septic system would be abandoned in accordance with applicable state laws. The staging area fill would be analyzed for total petroleum hydrocarbons (TPHs) that may have resulted from petroleum releases. If unacceptable levels of TPH concentrations are detected, the materials would be treated or removed in accordance with the current applicable regulations

(Idaho Administrative Procedures Act [IDAPA] 58.01.24). The staging area would then be ripped and regraded to approximate the natural topography. GM would be placed over the area as needed to a minimum depth of 12 inches, seeded, and fertilized.

Fuel tanks would be emptied, cleaned, and hauled off site. Any products removed from the tanks during decommission or resulting from cleaning would be recycled or hauled off to an agency-approved disposal area. Secondary containment structures would be cleaned and demolished. Resulting rubble would be tested for petroleum. Contaminated rubble would be transported off site to a licensed landfill for disposal in accordance with current applicable regulations. Uncontaminated rubble would be hauled off site. The area underneath the secondary containment and surrounding disturbance would be tested for petroleum. If unacceptable levels of contamination are detected, the extent of the contamination would be delineated, and impacted soils would be treated or removed based on current applicable regulations (IDAPA 58.01.24). The areas would then be ripped, regraded in a manner that blends with the natural topography, capped with GM as needed, and seeded.

Power lines at the Proposed Action and all fencing and warning signs would be removed when no longer needed and all materials taken off site.

Existing office and maintenance facilities located at Agrium's Rasmussen Ridge Mines would be used for mine administration, operation personnel, and equipment storage and maintenance. When no longer needed, the office, shop, and maintenance facilities would be demolished and reclaimed under the agency-approved reclamation plan for the Rasmussen Ridge Mines.

2.3.6.8 Revegetation

The objective of revegetation is to provide a self-regenerating cover that controls erosion and is easily established and meets the vegetation COPC concentration action levels in the PFO ARMP (BLM 2012). In addition, Agrium proposes to establish a plant cover suitable for post-mining land uses of grazing and wildlife habitat and to enhance the evapotranspiration function of the cover system. Revegetation would be of two types: interim revegetation on areas that would be subject to future re-disturbance and final revegetation. Proposed seed mixes are presented in **Table 2.3-3**.

Interim revegetation would be conducted as needed on cuts and fills, road fills, and other areas that would be re-disturbed as part of final reclamation using the same seed mix as that used for permanent reclamation. This cover would be a mixture of grasses and forbs selected solely to stabilize the surface against erosion. Agrium would use agency-approved seed mixes for species and application rates for interim revegetation. Seeding would typically occur in the fall.

Final revegetation, like interim revegetation, would be to stabilize the ground surface as well as to establish a plant cover suitable for post-mining land uses of grazing and wildlife habitat and to enhance the evapotranspiration function of the cover system. It is proposed that a mixture of grasses, forbs, and shrubs be used. All reclamation would be designed to meet the vegetation COPC concentrations established in the PFO ARMP.

The areas to be revegetated would be prepared to receive seeds through placement, grading, and smoothing of GM. Seeds would be drilled or broadcast onto the area. GM would be augmented with fertilizer based on soil analysis of the area. Revegetation would take place following preparation, typically in the fall. Appropriate BMPs to control invasive and noxious species would be implemented throughout the life-of-mine. As reclamation techniques and

philosophies change, Agrium would work with appropriate agencies to revise the seed mix and revegetation objectives.

2.3.6.9 Wetlands Mitigation or Replacement

Disclosing potential impacts to wetlands is a key issue for the EIS. Addressing potential wetland impacts and associated mitigation is the responsibility of the U.S. Army Corps of Engineers (USACE) through the Clean Water Act (CWA) Section 404 permitting process. As a cooperating agency, the USACE would use data and analysis from this Draft EIS to process Agrium's Section 404 permit application. Agrium would submit a Section 404 permit application before the issuance of the Final EIS. The Proposed Action includes provisions for impacts to wetlands. The USACE's Final Decision on Agrium's Section 404 permit application would incorporate Compensatory Mitigation for Losses of Aquatic Resources in compliance with 33 CFR Parts 523 and 332 and 40 CFR Part 230.

2.3.6.10 Wildlife Habitat Mitigation Approach and Habitat Equivalency Analysis

A Habitat Equivalency Analysis (HEA) has been prepared to estimate the wildlife habitat services that would be impacted by mining activities. The HEA uses habitat baseline information to evaluate the different wildlife habitats impacted in the Study Area and determines a value for the wildlife services lost as a result of ground disturbance and a value for the wildlife services gained through reclamation and mitigation. The acres and services lost or gained as a result of mining activities, reclamation, and mitigation are expressed quantitatively as Discounted Service Acre Years (DSAYs). Information from the HEA would be used in estimating the monetary cost to mitigate the impact, or to compare the net services lost with wildlife habitat services gained by mitigation.

The HEA addresses impacts to upland wildlife habitats, but not wetlands. Wetlands occur in the Study Area, but because jurisdictional wetlands are addressed in the USACE 404 permitting process and the USACE has determined that all wetlands in the Study Area are jurisdictional (USACE 2014), the Agencies and Agrium agreed that no wetlands should be included in the assessment of habitat service loss in the HEA.

The analysis process and results of the HEA are documented in several reports. The Wildlife Habitat Equivalency Analysis Baseline Metrics Report (ARCADIS 2014a) describes baseline (pre-mining) conditions for the habitats on the mine site. The conditions are expressed in terms of two values called metrics: (1) richness cover wetness (RICHCOVWET); and (2) within aspen overstory (WAO). The RICHCOVWET metric quantifies wildlife service habitat losses and gains for areas containing shrubs, forbs, and grasses, and the WAO metric quantifies losses and gains for habitat with an aspen forest type overstory (ARCADIS 2014a).

A second report, the Wildlife Habitat Equivalency Analysis Predictive Metrics Report (ARCADIS 2015a) describes how on-site baseline conditions for the Proposed Action are expected to change as a result of reclamation that is expected to restore wildlife habitat services. The report then identifies two hypothetical mitigation projects (a Stream Project and an Aspen Project) to illustrate how mitigation projects can offset lost wildlife habitat services. A third report, the Wildlife Habitat Equivalency Analysis Predictive Metrics Report Addendum (ARCADIS 2015b), describes how conditions are expected to change following reclamation under the RCA.

The HEA Report (ARCADIS 2015c) combines the information from the Baseline Metrics and Predictive Metrics Reports (ARCADIS 2014, 2015a,b) and presents the quantified impacts to

habitat services under the Proposed Action and alternatives using DSAYs as the measure. The HEA takes into account not only the wildlife services lost and gained as a result of impacts and reclamation, but also the timing of when the services are lost and when they return to maturity. The HEA Report also explains how mitigation projects would offset the on-site services lost.

Agrium has proposed to use a hypothetical mitigation project to calculate the cost of mitigating some or all of the lost wildlife habitat services (in terms of DSAYs) from the selected alternative. Because the selected alternative would not be known until after publication of the Draft EIS, the project and cost estimate would be described in a Wildlife Habitat Mitigation Plan prepared by Agrium after the Draft EIS is published, but before the ROD is signed. This document would include five components: (1) details of the hypothetical mitigation project(s); (2) the gain in DSAY values from the hypothetical project and the assumptions; (3) a calculation of the total cost to offset the lost DSAYs of the Proposed Action and selected alternative using the hypothetical mitigation project as a basis; (4) description of the provisions of the corresponding in-lieu fee to a third party; and (5) fulfillment of the voluntary mitigation.

The cost of the final hypothetical mitigation actions would be calculated in coordination with the Agencies. The BLM, Agrium, and other stakeholders would identify a third-party recipient of the in-lieu fee and confirm that the fee would be spent in accordance with the wildlife habitat mitigation objectives. After the ROD is signed, Agrium would provide the in-lieu fee to the third party.

2.3.7 Environmental Monitoring Plan

The Environmental Monitoring Plan (EMP) (**Appendix A**) identifies the environmental monitoring activities that would be undertaken at the mine to assure the effectiveness of BMPs and mitigation measures. The EMP identifies which resources need to be monitored and describes monitoring and sampling locations, approved monitoring and sampling methods, duration and frequency of sampling, and data reporting requirements. Some of the environmental monitoring, such as groundwater monitoring, was begun during baseline data collection to establish baseline conditions.

2.4 ALTERNATIVES DEVELOPMENT PROCESS

The primary goal of alternatives development is to identify and describe acceptable ways to address unresolved conflicts with the Proposed Action identified during scoping while meeting the purpose of and need for the Proposed Action. The NEPA process requires that alternatives evaluated in detail be reasonable. The regulations implementing NEPA provide a discussion that alternatives need to be reasonable (40 CFR 1500.1[e] and 1502.14). In addition, the Council on Environmental Quality's (CEQ's) 40 Most Asked Questions about NEPA (Question 2a) states, in part, "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense…" (CEQ 1981).

Alternatives development began with the compilation of a list of issues and indicators for these issues. The Agencies and ARCADIS analyzed these to identify modifications to project features, facilities, or operations to eliminate or reduce anticipated environmental effects to acceptable levels while fulfilling the purpose of and need for the Proposed Action. A suggested list of these elements was provided to Agrium in a letter (BLM 2012) requesting that they assist the Agencies by considering the feasibility of these elements for the development and operation of the Proposed Action. Agrium (Brown and Caldwell [BC] 2013a) developed a technical memorandum

discussing the feasibility of each of these alternative elements. The alternative elements were organized into the following seven categories:

1. Overburden storage and management
2. Infrastructure elements
3. Ore transport and access routes
4. Cap and cover systems
5. Wetlands mitigation
6. Mine sequencing and material handling
7. GM management and seed mix

GM storage and management and several of the elements of infrastructure (including locations for monitoring wells and water management features considered for potential alternatives) were found to be essential elements of the mitigation, reclamation, environmental monitoring, and water management plans common to all of the action alternatives. Consequently, they are not discussed here.

Additional exploration drilling and revisions to the Proposed Action resource model prompted reevaluation of the pit design. Ore reserves located at the north end of the Lease were found to continue northward onto land managed by the IDL. Recovery of this ore, if economically viable, is preferable under the BLM CFR directive of “ultimate maximum recovery” of resources on leasable lands.

2.5 ALTERNATIVES CONSIDERED

The process described above resulted in the development of several alternatives that specifically responded to one or more of the issues. Although a number of alternatives were developed, they were not all analyzed in detail. Some were deemed unreasonable early in the process. Others were eliminated after initial analysis indicated that they were not reasonable.

The alternatives developed for this NEPA analysis are described in two overall groups. The alternatives analyzed in detail are described first. The alternatives that were considered but eliminated from detailed analysis are described subsequently (**Section 2.8**).

2.5.1 Rasmussen Collaborative Alternative

An alternative to specific components of the Proposed Action, referred to as the Rasmussen Collaborative Alternative (RCA), was developed by Agrium in collaboration with P4, LLC (P4), the operator of the South Rasmussen Mine operating on State Lease #7958 and Federal Phosphate Lease IDI-23658. The alternative includes placement of Rasmussen Valley Mine overburden in the partially backfilled South Rasmussen Mine. The RCA revises the extent of the mine pit to recover additional ore and reduce the amount of water requiring management; use space in the P4 South Rasmussen Mine pit for storing overburden, thus eliminating the need for external overburden piles downslope of the pit; and proposes a new haul road alternative 5 (HR-5) which would aid in the placement of overburden in the P4 South Rasmussen Mine and greatly reduce wetland impacts relative to the Proposed Action. The haul road alternative also eliminates the need for new fuel facilities at the staging area near the pit, as proposed in the Proposed Action, because the alternative haul road routes mine traffic past existing fuel facilities at the Rasmussen Ridge Mines shop area. The RCA addresses concerns and issues raised in public and agency

scoping. In the following sections, the RCA will be compared to the Proposed Action, followed by a discussion of other alternative elements considered, but not carried forward for full analysis. The comparison begins with a description of proposed mining operations in relation to **Section 2.3.3**.

2.5.1.1 Lease Modifications

Mine disturbances outside the BLM Lease boundary are often proposed to allow activities such as additional phosphate ore to be recovered, pit walls to be laid back for safety, overburden backfill and external piles to be established, and ancillary facilities to be constructed such as roads and stockpiles. The following describes specific areas in which Agrium has requested activities outside of the Lease boundary, and how those activities could be authorized (**Table 2.5-1**).

Table 2.5-1 Proposed Lease Modifications and Use Permits for the Proposed Action and RCA

RCA		
Map ID*	**Type**	**Acreage**
A	Private Land Agreement	10.2
B	Modification (BLM)	55.9
C	Modification (BLM)	20.6
D	Temporary Use (State)	3.4
E	Special Use (USFS)	2.5
F	Special Use (USFS)	1.3
G	Special Use (USFS)	2.5
H	Temporary Use (State)	28.4
I	Modification (BLM)	19.6
J	Special Use (USFS)	4.0
K	Special Use (USFS)	3.5
L	Temporary Use (State)	10.0
	Total	**161.9**

* ID number from **Figure 2.5-1**

Proposed Action		
Map ID*	**Type**	**Acreage**
A	Private Land Agreement	10.2
B	Modification (BLM)	125.0
C	Modification (BLM)	35.8
	Total	**171.0**

* ID number from **Figure 2.3-1**

The RCA expands the pit and associated backfill to the northwest and adds external overburden disposal north of the Lease on the north end (**Figure 2.5-1**, **Table 2.5-1**). The pit, backfill, and a smaller portion of external overburden would extend onto state land (**Figure 2.5-1**, Area H; **Table 2.5-1**) and would need to be approved by IDL. The remainder of the external overburden outside the Lease would be placed on National Forest land and would require a BLM lease modification (**Figure 2.5-1**, Area I; **Table 2.5-1**).

In the Proposed Action, Agrium requested a lease modification on the southeast end of the Lease to allow the recovery of additional ore in the area. The RCA has reduced the area of the lease modification request on the southeast (**Figure 2.5-1, Table 2.5-1**, Area B) based on a revised location of the ore and pit informed by more recent exploration data.

A portion of the pit wall and a section of monitoring well access road are proposed on the IDFG Wildlife Management Area (WMA); **Figure 2.5-1**, Areas D and L; **Table 2.5-1**). Authorization for these activities in this area would be via an agreement between Agrium and the IDFG or a BLM lease modification.

The lease modification requested in the Proposed Action and RCA (Area A in **Figure 2.3-1** and **Figure 2.5-1; Table 2.5-1**) on privately owned land is not an option because the mineral estate is

owned by the landowner. Agrium would need to obtain an agreement for the activity from the private landowner.

The Proposed Action lease modification to place GM on National Forest Land outside the phosphate lease boundary (**Figure 2.3-1**, Area C) has been reduced in size in the RCA (**Figure 2.5-1**, Area C).

Without the authorization of these areas, economic ore would be left behind at the boundary between the Lease and the lease managed by the IDL in Section 36 of T6S, R44E, and on the southeast end of the deposit.

2.5.1.2 Other Use Authorizations

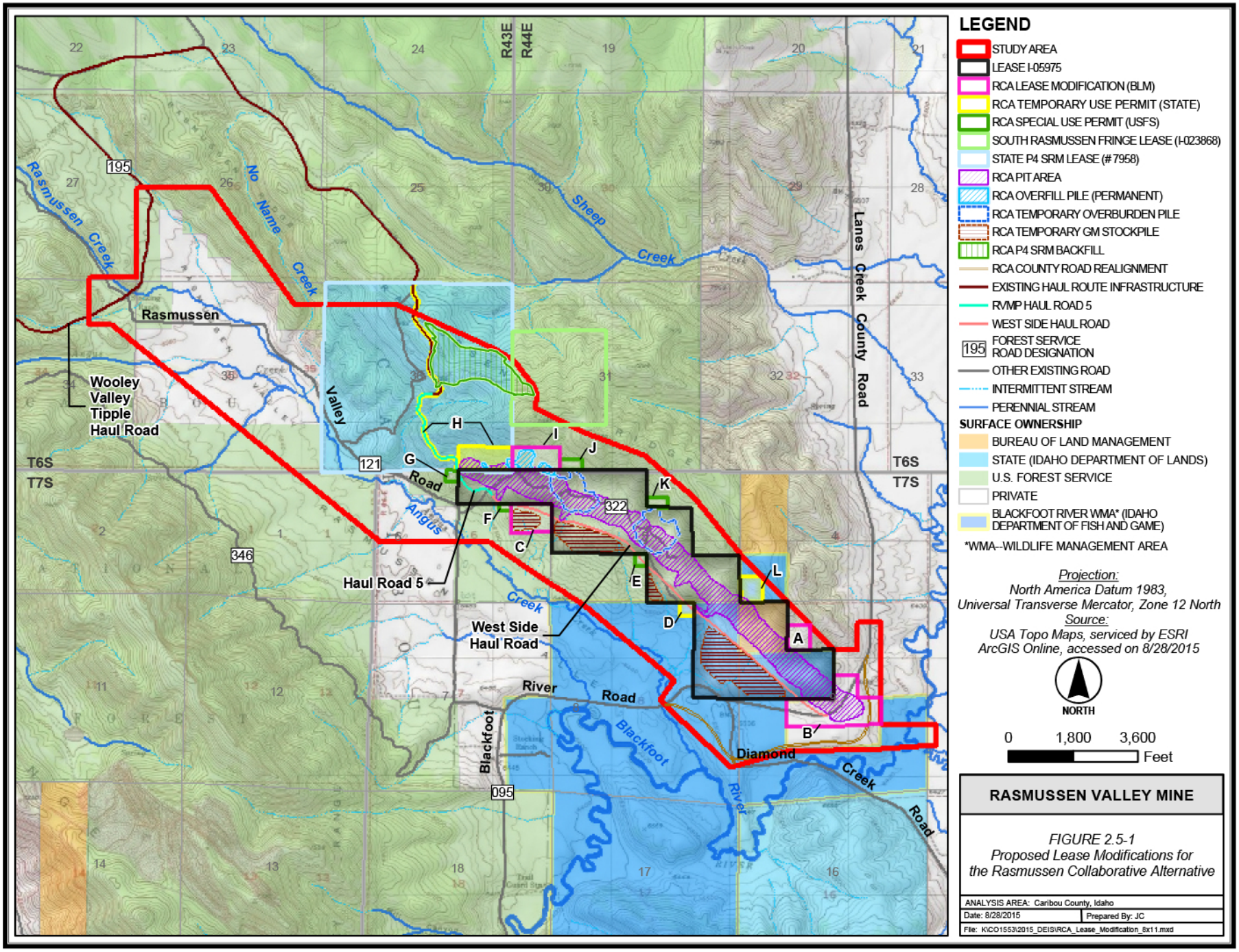
Additional use authorizations have been proposed in the RCA (**Figure 2.5-1**, Areas K, E, F and G). They consist of Special Use Authorizations (SUAs) on National Forest lands and agreements with landowners on the IDFG WMA.

2.5.1.3 Mining Operations

The RCA reflects Agrium's objectives to maximize the recovery of the economic phosphate resource and reduce environmental impacts compared to the Proposed Action. Some of the factors that influence these objectives include the economic strip ratio, ore quality and cutoff grades, and the safe angle of pit wall slopes. The considerations for long-term impacts to the environment include potential groundwater or surface water impacts, wetland impacts, visual impacts, and final reclamation objectives. Final reclamation objectives are to assure a return to multiple uses of the public lands, protect any used resources, and continued productive use of private lands. These objectives and factors determined the ultimate design of the open pit, external storage facilities, haul road design, and the mining sequence.

The RCA includes the following:

- Development of a larger open pit in a sequenced manner, consisting of nine phases beginning at the northwest and generally progressing southeast. The life-of-mine would be approximately 4.8 years, and the total project duration including reclamation would be 7.1 years (**Figure 2.5-2**);
- Placement of overburden from the initial phases into P4's partially backfilled and reclaimed South Rasmussen Mine pit, thus increasing the reclaimed area at the South Rasmussen Mine pit;
- Development and reclamation of up to four GM stockpile areas;
- Backfilling the majority of the mined out pit;
- Construction and reclamation of a staging area similar to Proposed Action;
- Use of electrical generators to power mine facilities such as the staging area;
- Realignment of portions of the Blackfoot River, Lanes Creek and Diamond Creek County Roads similar to the Proposed Action;
- Construction and reclamation of sediment control structures;
- Construction of two temporary overburden storage piles within the mine footprint;
- Extension of the pit floor to the Lease boundary at the north end to maximize ore recovery;
- Establishment of GM and alluvium borrow areas within the areas previously proposed for external overburden piles in the Proposed Action to be used to construct a backfill cap; and
- Reclamation with a larger variety of revegetation species.


LEGEND
STUDY AREA
LEASE I-05975
RCA LEASE MODIFICATION (BLM)
RCA TEMPORARY USE PERMIT (STATE)
RCA SPECIAL USE PERMIT (USFS)
SOUTH RASMUSSEN FRINGE LEASE (I-023868)
STATE P4 SRM LEASE (#7958)
RCA PIT AREA
RCA OVERFILL PILE (PERMANENT)
RCA TEMPORARY OVERBURDEN PILE
RCA TEMPORARY GM STOCKPILE
RCA P4 SRM BACKFILL
RCA COUNTY ROAD REALIGNMENT
EXISTING HAUL ROUTE INFRASTRUCTURE
RVMP HAUL ROAD 5
WEST SIDE HAUL ROAD
195 FOREST SERVICE ROAD DESIGNATION
OTHER EXISTING ROAD
INTERMITTENT STREAM
PERENNIAL STREAM
SURFACE OWNERSHIP
BUREAU OF LAND MANAGEMENT
STATE (IDAHO DEPARTMENT OF LANDS)
U.S. FOREST SERVICE
PRIVATE
BLACKFOOT RIVER WMA* (IDAHO DEPARTMENT OF FISH AND GAME)
*WMA--WILDLIFE MANAGEMENT AREA
Projection:
North America Datum 1983,
Universal Transverse Mercator, Zone 12 North
Source:
USA Topo Maps, serviced by ESRI
ArcGIS Online, accessed on 8/28/2015
NORTH
0 1,800 3,600
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.5-1
Proposed Lease Modifications for
the Rasmussen Collaborative Alternative
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\RCA_Lease_Modification_8x11.mxd
Rasmussen Creek
No Name Creek
Sheep Creek
Lanes Creek
County Road
Rasmussen
Wooley Valley Tipple Haul Road
Valley
Road
Angus
Creek
Haul Road 5
West Side Haul Road
River
Road
Blackfoot
Blackfoot River
Diamond Creek
Road
R43E
R44E
T6S
T7S
195
121
322
346
095
A
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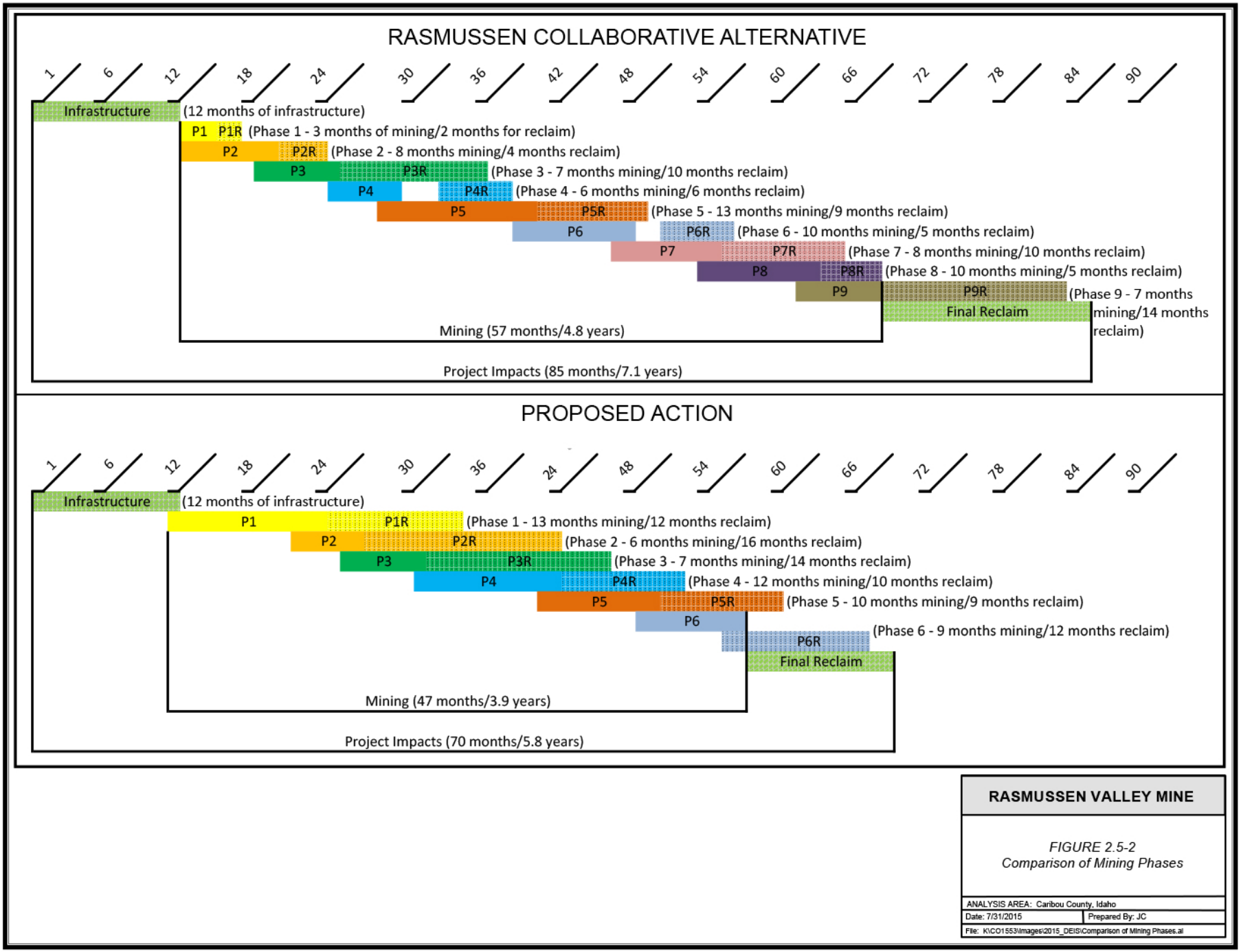


RASMUSSEN VALLEY MINE

FIGURE 2.5-2
Comparison of Mining Phases

ANALYSIS AREA: Caribou County, Idaho
Date: 7/31/2015 | Prepared By: JC
File: K\CO1553\Images\2015_DEIS\Comparison of Mining Phases.ai

The RCA eliminates the following from the Proposed Action:

- All external overburden storage piles downslope of the mine pit, including piles on potentially unstable areas or areas overlying alluvial aquifers;
- The proposed new fuel storage facilities at the staging area;
- The proposed power line that would have supplied power to Proposed Action facilities at the staging area;
- Mining below the water table, thus less water to manage;
- Eight stream crossings;
- The haul road across the floor of Rasmussen Valley and no crossing at Rasmussen Valley Road or Angus Creek;
- Ninety-eight percent of wetlands and waters of the U.S. (WOUS) disturbance;
- Sixty-six acres of aquatic influence zones (AIZs) impact; and
- Twenty acres of disturbance to forested and shrubland habitats.

The RCA would disturb approximately 40 fewer acres of overall disturbance than the Proposed Action, and much of that reduction in disturbance would be to sensitive areas such as wetlands outside the mine pit and backfill area (**Figure 2.5-2**). The expanded mine pit developed in nine phases would require a longer life-of-mine and would facilitate maximum ore recovery.

Natural resource protection measures, water management measures, and reclamation for the RCA would be the same as those for the Proposed Action.

Figure 2.5-3 shows the distribution of the RCA's facilities. **Table 2.5-2** lists the surface disturbances estimated for these activities.

Table 2.5-2 Total Project-Related New Surface Disturbance from the RCA Alternative, including Areas Outside of the Lease

Facility/Activity	Maximum Disturbance (acres)[1]					
	Private	USFS	BLM	IDFG	IDL	Total[4]
Open Pit and Backfill[2]	18.5	120.6	23.3	43.2	7.6	213.2
Permanent External Overfill Piles	0	6.8	0	0	0.7	7.4
Temporary External Overburden Piles[3]	0	14.8	0	0	0	14.8
Haul Roads	2.6	24.3	0.8	11.9	17.7	57.3
Groundwater Monitoring Access Roads	2.6	3.5	1.0	1.4	0	8.5
Facilities	0	0.9	0	0	0	0.9
Water and Sediment Control Structures (est.)	0.5	4.6	0.5	1.3	0.5	7.4
Realigned Portions of the County Roads	3.1	0	0	2.9	0	5.9
GM Stockpiles	0	35.0	0.1	49.3	0	84.4
Total[4]	**27.3**	**210.5**	**25.7**	**110**	**26.5**	**399.8**

Notes:

1 Disturbance acres are for comparison with the disturbance acreages listed for the Proposed Action (**Table 2.3-1**).

2 Includes 13.2 acres of unreclaimed pit wall.

3 Disturbance acreage for those portions of the Central and South Temporary Overburden Piles outside of the mine pit.

4 Row and column totals are based on more precise numbers (more decimal places) than are shown in the table, and because of rounding conventions the totals may appear to be lower than the sum of the numbers in a row or column

2.5.1.3.1 Mine Design

The larger pit footprint of the RCA would be mined from north to south in nine phases in contrast to south to north in six phases for the Proposed Action. Pit design would be subject to the same constraints as those for the Proposed Action. The nine phases together would be approximately 2.4 miles long and average approximately 600 feet wide. The phases would range in length from approximately 1,000 to 2,600 feet. However, each phase may not be a continuous pit and may be operated in multiple locations at the same time. Ultimate pit depth would be controlled by the same factors as those addressed in the Proposed Action, except in the southern portions of the pit, where the pit floor would be kept high enough to not overwhelm water management capabilities.

The open pit and backfill would disturb a total of 213.2 acres. Pit backfill would result in 200 acres, which would be reclaimed and 13.2 acres of exposed pit wall. Use of the South Rasmussen Mine for permanent overburden storage, in combination with temporary overburden storage within and upslope of the active mine footprint, would eliminate the disturbance and need to store overburden in areas downslope of the mine footprint. As in the Proposed Action, as mining progresses, reclamation would be started on the mined out areas. Through progressive open pit backfilling and concurrent reclamation, the unreclaimed pit disturbance at any one time would be minimized. Upon completion of mining operations, approximately 13.2 acres of pit wall (limestone) exposures would remain unreclaimed, and backfill would be placed to eliminate the exposure of all Meade Peak-containing materials in the pit walls. The pit backfill and overfill areas would be capped with the Alternative 6 Cover C cap and cover system.

A small road would be constructed along the crests of the pit to provide access to lighting stations and to conduct pit wall inspections. This road would be approximately 20 feet wide to accommodate a dozer or equivalent and light vehicles. The Mine Safety and Health Administration (MSHA) requires the removal of potential fall hazards from around the pit crest. While establishing this proposed road, trees, boulders, or other potential fall hazards would be removed from the pit crest area.

2.5.1.3.2 Haul Roads

As in the Proposed Action, the West Side Haul Road would extend for approximately 2.3 miles along the southwest side of the mine pit. Unlike the Proposed Action, which would begin mining at the south end and require building the entire West Side Haul Road at the beginning of mining, in the RCA, the West Side Haul Road would be constructed piecemeal, concurrent with the mine phases as they progress south.

HR-5, which climbs Rasmussen Ridge and crosses the South Rasmussen Mine, would be constructed between the terminus of the West Side Haul Road at the north extent of the Lease and the existing Agrium haul road north of South Rasmussen Mine. The existing Agrium haul road continues northwest, passing by the Rasmussen Ridge Mines shop area, then connects to the Wooley Valley Tipple Haul Road. HR-5 would extend through the previously mined and reclaimed West Limb Pit of P4's South Rasmussen Mine and generally follow the historical South Rasmussen Mine haul road through the mine's reclaimed main pit. Construction of the haul road would be completed before the start of mining Phase 1 at Rasmussen Valley. HR-5 would not cross Rasmussen Valley, reducing total potential wetlands disturbance from 20.5 acres in the Proposed Action to 0.3 acre in the RCA. Agrium would implement all necessary BMPs to protect wetlands.

In addition to providing a route for hauling ore, the West Side Haul Road and HR-5 would connect mining operations in the pit with the staging area, GM stockpiles and temporary overburden piles, existing facilities at the Rasmussen Ridge Mines, and other mine facilities. Design parameters for the haul roads would be the same as those for the Proposed Action.

2.5.1.3.3 Material Management

Material management includes the storage and re-handling of backfill, GM, unconsolidated alluvium and colluvium from below GM salvage depths, overburden, and non-Meade Peak-containing material. Because alluvium is overlain by GM, alluvium and colluvium to be used at the mine would often be managed concurrently with GM.

Backfill and Overburden

Approximately 42.4 million bank cubic yards (MBCY) (48.7 million loose cubic yards [MLCY]) of overburden would be excavated during the life-of-mine and would be directly placed as backfill in the South Rasmussen Mine pit, or in previously mined phases of the Rasmussen Valley Mine pit, or would be stored in either temporary or permanent external overburden piles located upslope and contiguous with the Rasmussen Valley Mine backfill. Some limestone material removed from the pits would be used in the construction of the West Side Haul Road.

Mining was completed at the South Rasmussen Mine in 2013, and reclamation was underway. The South Rasmussen Mine is currently partially backfilled and reclaimed. Topographic data and analysis indicate that, under P4's current mine plan, the South Rasmussen Mine pit could accommodate up to 12.7 MBCY of material within the partially backfilled pit, leaving space for the Rasmussen Valley Mine overburden. The majority of overburden mined from Phases 1 and 2 and a portion from Phases 3 and 4, approximately 6.6 MBCY (7.6 MLCY) or 15.6 percent of the total excavated from Rasmussen Valley Mine, would be directly placed as backfill at South Rasmussen Mine. Backfill placed at the South Rasmussen Mine would be reclaimed in accordance with the South Rasmussen Mine Reclamation Plan Modification (P4 2014). Reclamation would use materials from the South Rasmussen Mine and would not require use of any GM or other materials from the Rasmussen Valley Mine. The overburden placed in the South Rasmussen Mine pit would cover previously mined areas and would not create any new disturbance.

At the Rasmussen Valley Mine, the remaining 35.8 MBCY (41.1 MLCY; 84.4 percent) of overburden would be placed as backfill in the pit or in external overburden piles planned as overfill located up slope from and contiguous with pit backfill outside of the northern pit crest in three locations. The external overfill piles would be contiguous with the adjacent pit backfill and total 7.4 acres. They have been designated Overfill Piles 1, 2, and 3 (**Figure 2.5-3**). The ultimate backfill and overfill area at Rasmussen Valley would cover approximately 200 acres, less than the total open pit and overfill area (213.2 acres) because it does not include 13.2 acres of pit wall that would be left exposed.

Three methods would be used to place backfill in mined out areas (pits). Overburden may be dumped or pushed from the pit crest, placed in lifts, and plug or butt dumped. Placement from the pit crest may be used in backfill areas that do not require the construction of in-pit backfill ramps for access and where material slope stability characteristics are suitable to support the long repose slopes of crest placement backfill. Alternatively, backfill lifts might be used in areas where the backfill slope stability characteristics do not allow long repose slopes without crest failures or toe mounding into active mining areas. Backfill lifts may also be used during wet weather conditions, which allow the mining operation multiple backfill dumping locations to use if a

particular backfill area becomes muddy and difficult to maintain. Lift heights would be determined based on safety considerations and the overburden material repose slope stability characteristics. The backfill placement method would be determined for specific areas based on factors including the need for backfill ramps, stability of the material as it is placed, availability of equipment to maintain truck working areas, and the stage of the backfilling process.

On occasion, plug or butt dumping may be used if equipment failure causes the loss of support equipment to maintain the area. Plug or butt dumping may also be used in areas receiving final cap or cover materials or to place material on a backfill lift.

All backfill and overfill areas would be graded to not exceed a 3H:1V final slope. The minimum slope allowed in the backfill areas would be 2 percent in order to promote runoff and not allow standing water. No low-elevation areas that could result in ponding water would be allowed. The Rasmussen Valley Mine pit would be backfilled to the western pit crest, with the final backfill slope rising toward the pit wall. Small portions of exposed limestone pit wall would remain along the eastern crest of the mine. All temporary overburden piles and reclaimed haul road materials would be placed in the Phases 8 and 9 backfill. Total re-handle of material from temporary overburden piles and haul roads would be approximately 4.68 MBCY (5.38 MLCY).

All overburden volumes have been designed based on a net 15 percent swell factor. This accounts for swelling of overburden during the mining process and incidental equipment and natural compaction during and after the placement of the overburden. This swell factor is assumed to be conservative based on current Agrium operations.

Temporary Overburden Storage

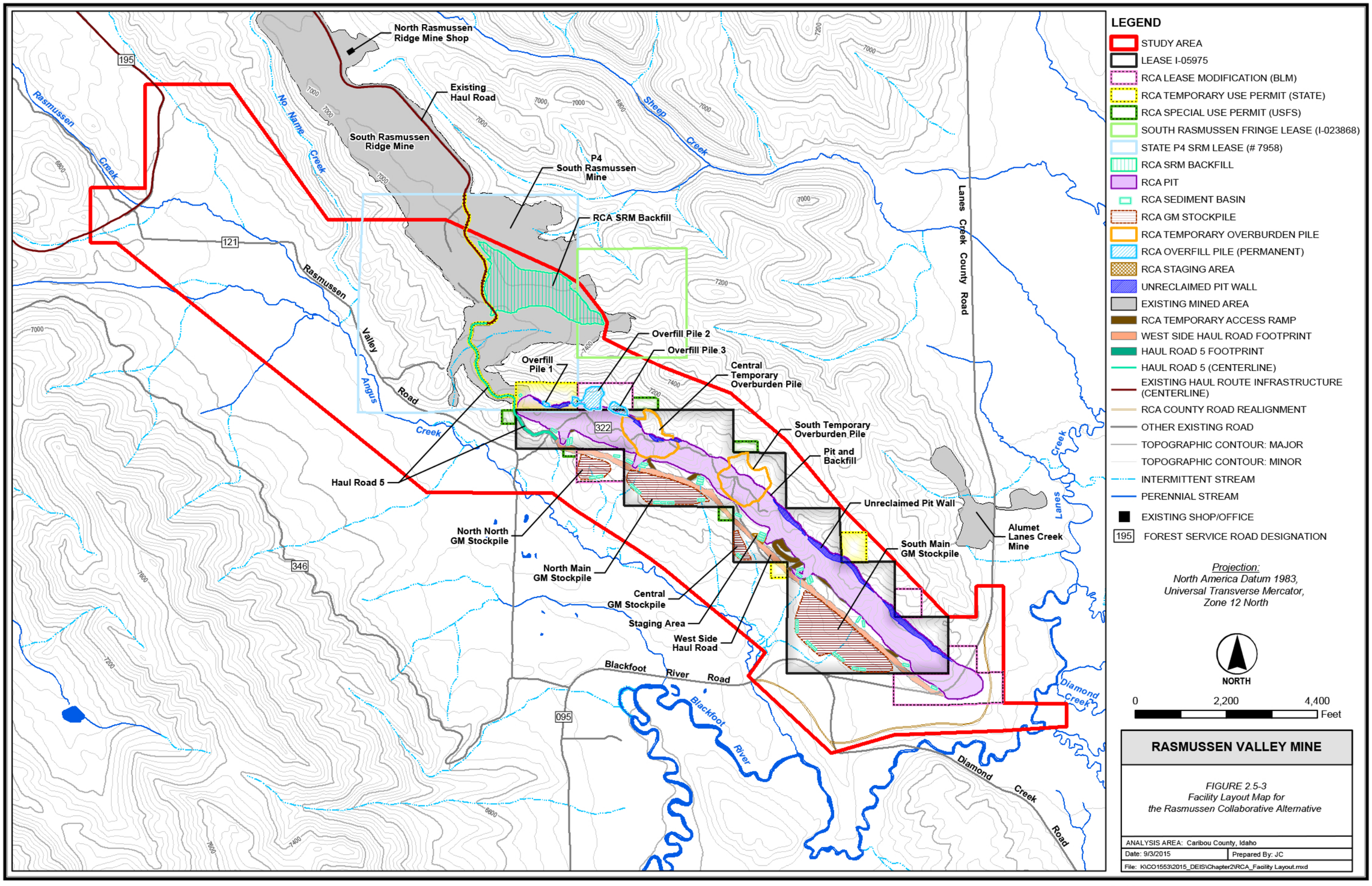
Two temporary overburden piles are incorporated into the design. They are identified as the Central Temporary Overburden Pile and South Temporary Overburden Pile. These temporary overburden piles would be used for temporary storage of material when operations produce more overburden than space is available for permanent disposal.

The Central Temporary Overburden Pile would be an overfill pile within and upslope of Phases 3 and 4. The available storage volume would be approximately 2.19 MBCY (2.52 MCLY). There would be approximately 6.3 acres of new disturbance outside of the pit crest. This overburden pile would consist predominantly of material from Phases 5 and 6. Operational constraints may require some flexibility in these estimates as mining occurs.

The Southern Temporary Overburden Pile would be an overfill pile within and upslope of Phase 4 and 5. The available storage volume would be approximately 1.53 MBCY (1.76 MCLY). There would be approximately 8.5 acres of new disturbance outside of the pit crest. This overburden pile would consist predominantly of material from Phase 7. Operational constraints may require some flexibility in these estimates as mining occurs.

GM and Alluvium Storage

Throughout the life-of-mine, soil suitable for GM would be used in concurrent reclamation activities or temporarily stored in stockpiles throughout the project. It is anticipated that approximately 1.15 MBCY (1.32 MLCY) of topsoil would be removed from the disturbed areas for use as GM. This is based on the soil depths identified in the baseline soils surveys (AECOM 2012; 2014) and suitability for use as GM (ARCADIS 2015d; 2015e). Agrium has calculated that approximately 0.86 MBCY (0.99 MLCY) of GM would be required for final reclamation (BC 2015a).


North Rasmussen Ridge Mine Shop
Existing Haul Road
South Rasmussen Ridge Mine
P4 South Rasmussen Mine
RCA SRM Backfill
Overfill Pile 2
Overfill Pile 3
Overfill Pile 1
Central Temporary Overburden Pile
South Temporary Overburden Pile
Pit and Backfill
Haul Road 5
Unreclaimed Pit Wall
South Main GM Stockpile
Alumet Lanes Creek Mine
North North GM Stockpile
North Main GM Stockpile
Central GM Stockpile
Staging Area
West Side Haul Road
Rasmussen Creek
No Name Creek
Sheep Creek
Rasmussen Valley Road
Angus Creek
Lanes Creek County Road
Blackfoot River Road
Blackfoot River
Diamond Creek
Diamond Creek Road
195
121
322
346
095
LEGEND
STUDY AREA
LEASE I-05975
RCA LEASE MODIFICATION (BLM)
RCA TEMPORARY USE PERMIT (STATE)
RCA SPECIAL USE PERMIT (USFS)
SOUTH RASMUSSEN FRINGE LEASE (I-023868)
STATE P4 SRM LEASE (# 7958)
RCA SRM BACKFILL
RCA PIT
RCA SEDIMENT BASIN
RCA GM STOCKPILE
RCA TEMPORARY OVERBURDEN PILE
RCA OVERFILL PILE (PERMANENT)
RCA STAGING AREA
UNRECLAIMED PIT WALL
EXISTING MINED AREA
RCA TEMPORARY ACCESS RAMP
WEST SIDE HAUL ROAD FOOTPRINT
HAUL ROAD 5 FOOTPRINT
HAUL ROAD 5 (CENTERLINE)
EXISTING HAUL ROUTE INFRASTRUCTURE (CENTERLINE)
RCA COUNTY ROAD REALIGNMENT
OTHER EXISTING ROAD
TOPOGRAPHIC CONTOUR: MAJOR
TOPOGRAPHIC CONTOUR: MINOR
INTERMITTENT STREAM
PERENNIAL STREAM
EXISTING SHOP/OFFICE
195 FOREST SERVICE ROAD DESIGNATION
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
NORTH
0
2,200
4,400
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.5-3
Facility Layout Map for
the Rasmussen Collaborative Alternative
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Chapter2\RCA_Facility Layout.mxd

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Four areas have been proposed for the borrowing of topsoil and alluvium for the construction of the cover over the pit backfill, for alluvium, and for GM storage for use throughout the project. These areas are designated as the North-North GM Stockpile, North Main GM Stockpile, Central GM Stockpile, and South Main GM Stockpile. Material would be added to and removed from the four stockpiles throughout the life-of-mine as operations and material needs dictate. The maximum potential disturbance of the North-North GM Stockpile would be 8.3 acres, for the North Main Stockpile would be 22.8 acres, for the Central GM Stockpile would be 4.1 acres, and for the South Main GM Stockpile would be 49.5 acres. None of the stockpiles would impact wetlands. Approximately 680,000 bank cubic yards (or averaging approximately 5 feet per acre) of GM/alluvium would be removed from the four borrow areas for use in constructing the cover on the pit backfill. Disturbance from these stockpiles would be fully reclaimed after the completion of mining.

Most of the GM and unconsolidated alluvium and colluvium from Phases 1 through 4 would be temporarily stored and used for reclamation. Alluvium from the footprints of Phases 5 through 9 would be used as needed. It is anticipated that approximately 3.70 MBCY (4.26 MLCY) of unconsolidated alluvium and colluvium would be removed from all disturbed areas both within the pit boundary and from the alluvium borrow areas.

2.5.1.4 Ancillary Facilities

Proposed RCA facilities include a staging area, an existing off-site fuel storage area, diesel generators, and dust suppression and water supply tanks.

2.5.1.4.1 Staging Area

As in the Proposed Action, a staging area would be constructed as a place for miners to meet, receive operational instructions, and discuss safety items as needed. A temporary structure would be constructed or transported to the staging area, would be fitted with showers for emergency needs, and would have portable restrooms as required by applicable regulations. In addition, the staging facility would support emergency response and rescue equipment and vehicles. A wastewater holding tank would be needed to accommodate the emergency showers. The staging area would also have a "ready-line" or place to temporarily keep equipment when not in operation. The ready-line may be used for minor maintenance. Electrical power would be required for each component of the staging area. The staging area would be constructed during the mining of Phase 4 while the West Side Haul Road is developed to this location.

2.5.1.4.2 Fuel Storage

Rather than maintaining fuel storage at the staging area, fuel would be distributed from existing tankage at the Rasmussen Ridge Mines shop area or through the use of fuel trucks that comply with relevant federal and state regulations. The total fuel storage capacity at the Rasmussen Ridge Mines shop facility is approximately 40,000 gallons. This quantity is deemed sufficient to maintain project-related operations for approximately 96 hours. Fuel is stored in multiple aboveground tanks to reduce the risk of spillage and containment requirements. Barriers exist under and around fuel tanks that meet applicable requirements for secondary containment of petroleum products.

2.5.1.4.3 Diesel Generators

Agrium anticipates that diesel generators would provide electrical power to RCA facilities. Supplying on-site diesel power generation would eliminate the disturbance associated with constructing a power line from the existing transmission line located in Upper Valley to the

proposed facility location. The necessary number of generators and horsepower of those generators may change through the life-of-mine. For the purpose of the RCA, it is assumed that the generator array currently in use at the Rasmussen Ridge Mines would be sufficient to accommodate operations at the RVMP. Operation of the generators would continue through the life-of-mine. The current array includes:

- One - 1,093-horsepower (hp) diesel generator (main generator)
- One - 67 hp diesel generator (mine shovel)
- One - 388 hp diesel generator (support generator)
- One - 100 hp diesel generator (dust suppression well pump)
- Three - 126 to 315 hp diesel generators (seasonal run-off control)
- Fifteen - 67 hp diesel-fired light plants (night shift lighting)
- One - 98 hp diesel generator (dust suppression well pump)
- One - 90 hp diesel generator (contractor building)
- One - 52 hp diesel generator (mine pit equipment)

2.5.1.4.4 Dust Suppression and Water Supply Tanks

Water for operations, principally dust suppression, would be supplied from both the existing well at the Rasmussen Ridge Mines shop and the existing well designated PW-1W, located near the south end of the lease. The tanks, if constructed, may be filled by tanker trucks or by pumping from either the Rasmussen Ridge Mines shop well or PW-1W. Water stored in the tanks would be used for operations. Water from the pit dewatering operation may also be used for dust suppression after assuring that it meets applicable water quality standards.

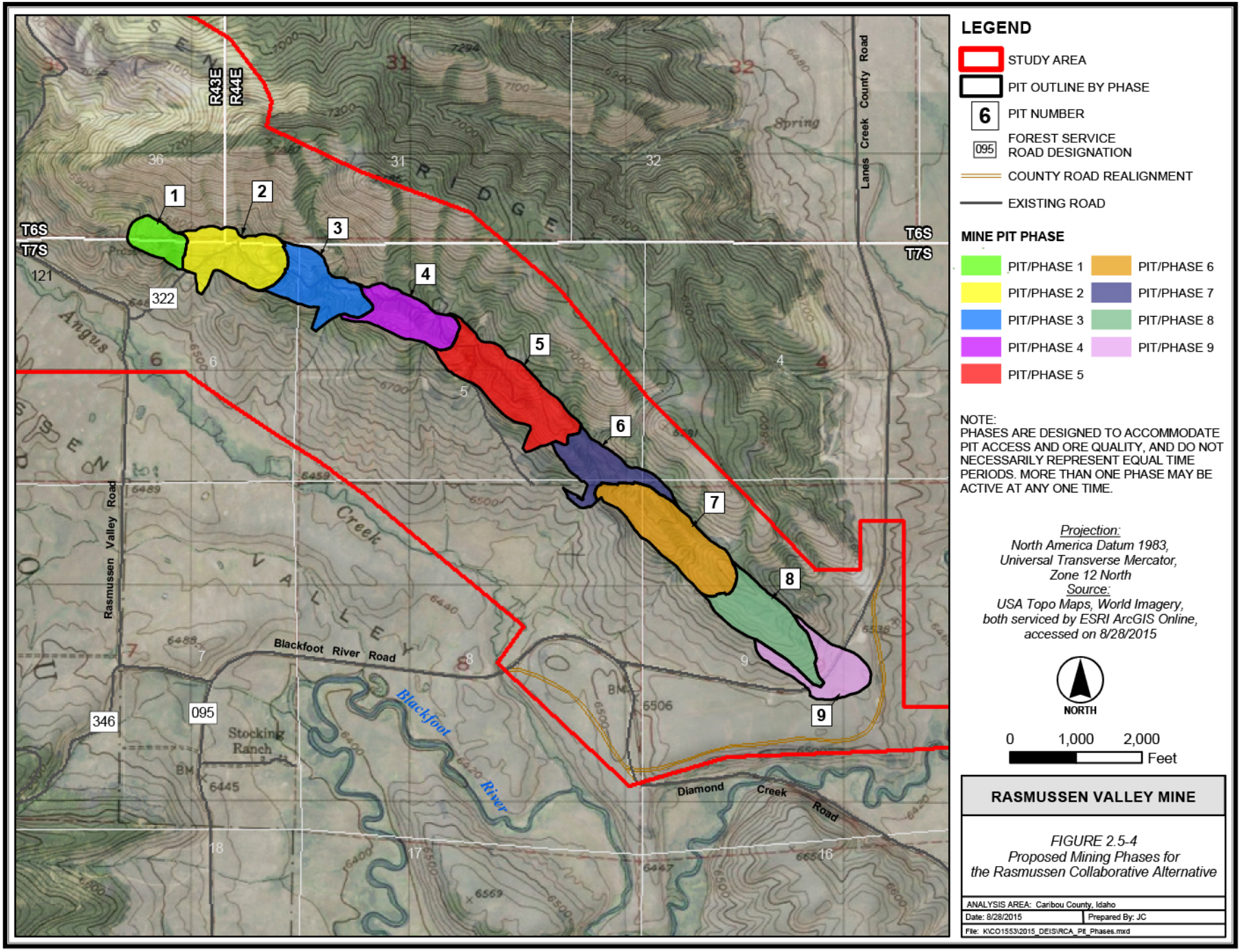
It is estimated that Agrium would use from 30,000 to 80,000 gallons of water per day for dust suppression through the months of April to November. The quantity of water required would depend on the haul road length required to transport ore for a given phase of mining.

2.5.1.5 Mining Sequence

The development of the open pit has been designed in a phased manner to achieve complete mining of the ultimate pit. A total of nine mining phases were designed. Phases are identified as RCA Phase 1 through Phase 9 (**Figure 2.5-4**).

The mining sequence was developed based on several assumptions and concerns including maintaining a transportation connection between areas being mined and areas being backfilled, and permanent disposal of overburden as backfill in South Rasmussen Mine and mined out phases of the RCA. Individual phases have been designed to maintain access for equipment, personnel, and supplies and to facilitate stormwater control.

Mining would begin from the north end (RCA Phase 1) and proceed generally southward. Phase 6 would be mined out of spatial order to facilitate the minimum time disruption of Phase 7, which incorporates the deep draw towards the south end of the pit. This drainage is within sub-watershed 4 and is also the drainage for sub-watersheds 2 and 3. The total sub-watershed acreage collected through the drainage in Phase 7 is 129.9 acres. It is an important geomorphic feature that would be disturbed for the shortest duration operationally possible.


LEGEND
STUDY AREA
PIT OUTLINE BY PHASE
6 PIT NUMBER
095 FOREST SERVICE ROAD DESIGNATION
COUNTY ROAD REALIGNMENT
EXISTING ROAD
MINE PIT PHASE
PIT/PHASE 1
PIT/PHASE 2
PIT/PHASE 3
PIT/PHASE 4
PIT/PHASE 5
PIT/PHASE 6
PIT/PHASE 7
PIT/PHASE 8
PIT/PHASE 9
NOTE:
PHASES ARE DESIGNED TO ACCOMMODATE PIT ACCESS AND ORE QUALITY, AND DO NOT NECESSARILY REPRESENT EQUAL TIME PERIODS. MORE THAN ONE PHASE MAY BE ACTIVE AT ANY ONE TIME.
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps, World Imagery,
both serviced by ESRI ArcGIS Online,
accessed on 8/28/2015
NORTH
0 1,000 2,000
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.5-4
Proposed Mining Phases for
the Rasmussen Collaborative Alternative
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\RCA_Pit_Phases.mxd
R43E
R44E
T6S
T7S
Lanes Creek County Road
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
Stocking Ranch
Blackfoot River
Spring Creek
Angus Creek
095
322
346
121

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In an effort to balance pit materials with available backfill volume, each phase was designed to be between 1,000 and 2,600 feet long and 600 feet wide. Most of a phase would be mined before commencing mining in the next phase. However, there would be some concurrent mining of multiple mine phases to maintain a constant grade of ore for processing purposes, to maintain the appropriate stripping ratio for waste management purposes, and to allow large excavation equipment to continue to operate while the narrow lower elevations of a phase are mined with smaller equipment.

2.5.1.6 Natural Resources Protection

Natural resources protection issues and measures for the RCA would be the same as those discussed for the Proposed Action. Largely because of the HR-5, very small areas of wetlands and riparian areas would be affected, and there would be less potential for effects to surface water requiring fewer or less extensive measures to protect surface water, wetlands and riparian areas, and aquatic habitat.

2.5.1.7 Water Management

Water management features for the RCA would be similar to those for the Proposed Action, but there would be fewer culverts. In addition, overburden piles would be less extensive compared to the Proposed Action. The HR-5 alternative would be much shorter than the HR-1 alternative, and would not cross drainages and wetlands. The Proposed Action would include eight culverts for the Rasmussen Valley Haul Road (HR-1; Culverts 1 through 8) and seven culverts for the West Side Haul Road (Culverts 9 through 14, and 16). In contrast, the RCA would include only two culverts for the HR-5 (Culverts 1 and 2) and seven culverts for the West Side Haul Road (Culverts 3 through 9). The HR-5 has six fewer culverts than the HR-1 Haul Road and only two sediment basins The culverts for the West Side Haul Road for the RCA drain the same drainage areas as the Proposed Action culverts for the West Side Haul Road and are in equivalent locations (**Table 2.5-3**, **Figure 2.5-5**).

Table 2.5-3 RCA Surface Water Drainage Structures

Structure #	Project Stage	Location	Drainage[1]	Design Basis
Culvert 1	Mining	HR-5	Drainage 23	50-year, 24-hour
Culvert 2	Mining	HR-5	Drainage 21	50-year, 24-hour
Culvert 3	Mining	West Side Haul Road	Drainage 12 (13)	50-year, 24-hour
Culvert 4	Mining	West Side Haul Road	Drainage 10 (14)	50-year, 24-hour
Culvert 5	Mining	West Side Haul Road	Drainage 8 (15)	50-year, 24-hour
Culvert 6	Mining	West Side Haul Road	Drainage 5, 6, 7 (16)	50-year, 24-hour
Culvert 7	Mining	West Side Haul Road	Drainage 2, 3, 4 (17)	50-year, 24-hour
Culvert 8	Mining	West Side Haul Road	Drainage 1 (18)	50-year, 24-hour
Culvert 9	Mining	West Side Haul Road	Drainage (19a)	50-year, 24-hour

Notes:

1 The drainage areas in parentheses are re-established drainage areas across the reclaimed mine pit.

2.5.1.8 Reclamation

2.5.1.8.1 Backfill Sequence

Mining and initial construction of the West Side Haul Road would begin with Phase 1. The portion of HR-5 that would be on the P4 state lease would be constructed from material taken from the P4 state lease. Mixing of road-building materials between the Rasmussen Valley Mine and the South

Rasmussen Mine is not anticipated. Final determination of this would be controlled by material availability, material properties, and operational constraints. All overburden needing to be moved would be placed either in the Rasmussen Valley Mine pit or in South Rasmussen Mine pit.

Most of the overburden from Phases 1, 2, and 3 would be directly placed in South Rasmussen Mine. Material from these three phases would be transported by haul truck along the West Side Haul Road and HR-5 and placed by end dumping or butt dumping in the open pit at the south end of South Rasmussen Mine. South Rasmussen Mine is currently approved to partially backfill the pit to an elevation adequate to cover all exposed ore sections followed by a minimum of 5 feet of limestone and 18 inches of GM, and to seed with an approved seed mix. Under the RCA, after completion of backfill operations, the backfill at South Rasmussen Mine would be covered and reclaimed following P4's modified and state-approved Reclamation Plan Modification (P4 2014). The final slopes for the South Rasmussen Mine partial backfill and cover would not exceed 3H:1V. The additional backfill and expanded reclamation under the RCA would require IDL approval.

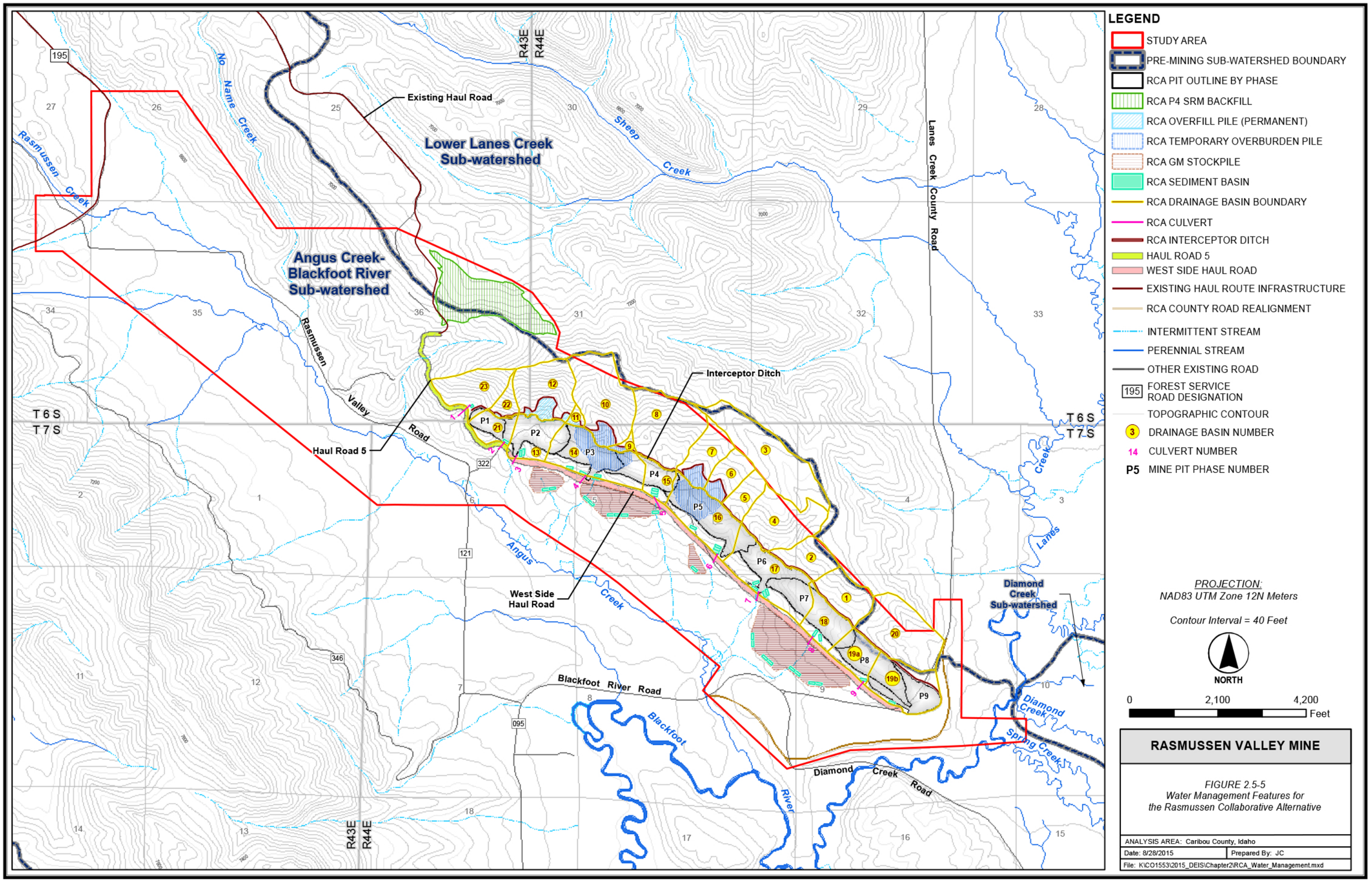
After mining is complete in Phases 1, 2, and 3, direct placement of backfill from phase to phase would be conducted to the extent possible, reducing the need for additional storage piles. Backfilling would continue in this fashion for the remainder of mining activities in the open pit. When mining is completed, no portion of the mine pit would remain open. Small portions of the limestone pit wall would remain exposed along the eastern crest of the mine. Final backfill surfaces would have a maximum slope of 3H:1V and a minimum slope of 2 percent to promote runoff. No depressions that could result in ponding would remain, and all backfill surfaces would be secured under the cap and cover system.

2.5.1.8.2 Haul Road Reclamation

Haul road reclamation would follow a procedure similar to that described for the Proposed Action. Any material removed during the reclamation of haul roads would be treated as Meade Peak overburden and re-handled to the pit as backfill.

All reclamation has been designed to meet the vegetation COPC concentrations in the PFO ARMP. For all haul roads, the first stage of road reclamation would be to remove safety berms as necessary, particularly in areas of potential selenium contamination. Haul road material that is removed would be placed as backfill within the mine. Road material would be removed beginning with the outside edges and working inward to the centerline. Maximum practical effort would be made to not increase the cross-sectional footprint of the road during reclamation. Reshaping of the road would leave a reclaimed surface that has maximum slopes of 3H:1V, with the edges blending into the natural topography and having no ledge where the reclaimed edge meets the original grade. Reshaping would be achieved by removal of material to the specified dimensions and contours, not by spreading material out beyond the original disturbance area. Once shaped, all reclaimed surfaces would be covered with a minimum of 12 inches of GM and revegetated.

Haul road culverts and all road fill materials overlying the culverts would be removed. A minimum of 8 feet of fill on either side of the original drainage would be removed. GM would be placed in areas where it had been removed for haul road construction. BMPs would be implemented to address erosion until vegetation is reestablished. Any associated nearby water management structures, such as sediment ponds, would also be reclaimed as part of haul road reclamation. Water management structures would be cleaned of any materials potentially containing selenium or other COPCs before the originally excavated materials are used to fill the structures. Any Meade Peak-containing material from haul roads, berms, or water management structures would be disposed of as backfill within the mine.


LEGEND
STUDY AREA
PRE-MINING SUB-WATERSHED BOUNDARY
RCA PIT OUTLINE BY PHASE
RCA P4 SRM BACKFILL
RCA OVERFILL PILE (PERMANENT)
RCA TEMPORARY OVERBURDEN PILE
RCA GM STOCKPILE
RCA SEDIMENT BASIN
RCA DRAINAGE BASIN BOUNDARY
RCA CULVERT
RCA INTERCEPTOR DITCH
HAUL ROAD 5
WEST SIDE HAUL ROAD
EXISTING HAUL ROUTE INFRASTRUCTURE
RCA COUNTY ROAD REALIGNMENT
INTERMITTENT STREAM
PERENNIAL STREAM
OTHER EXISTING ROAD
195 FOREST SERVICE ROAD DESIGNATION
TOPOGRAPHIC CONTOUR
3 DRAINAGE BASIN NUMBER
14 CULVERT NUMBER
P5 MINE PIT PHASE NUMBER
Existing Haul Road
Lower Lanes Creek Sub-watershed
Angus Creek-Blackfoot River Sub-watershed
Diamond Creek Sub-watershed
Interceptor Ditch
Haul Road 5
West Side Haul Road
Lanes Creek County Road
Rasmussen Valley Road
Blackfoot River Road
Diamond Creek Road
No Name Creek
Sheep Creek
Rasmussen Creek
Angus Creek
Blackfoot River
Diamond Creek
Spring Creek
Lanes Creek
R43E
R44E
T6S
T7S
P1
P2
P3
P4
P5
P6
P7
P8
P9
PROJECTION:
NAD83 UTM Zone 12N Meters
Contour Interval = 40 Feet
NORTH
0
2,100
4,200
Feet
RASMUSSEN VALLEY MINE
FIGURE 2.5-5
Water Management Features for
the Rasmussen Collaborative Alternative
ANALYSIS AREA: Caribou County, Idaho
Date: 8/28/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Chapter2\RCA_Water_Management.mxd

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Reclamation at the South Rasmussen Mine would differ from that at the Rasmussen Valley Mine. The portions of HR-5 crossing the South Rasmussen Mine Lease would be reclaimed according to the current state-approved South Rasmussen Mine Reclamation Plan Modification. Most of HR-5 on the P4 South Rasmussen Mine lease crosses existing overburden backfill or overburden piles. Where the road crosses overburden, it would be reclaimed by filling in the road prism to original contours including a minimum of 5 feet of limestone followed by 18 inches of GM and the approved seed mix in accordance with the current South Rasmussen Mine Reclamation Plan Modification. A short section of the road that disturbs natural ground would be recontoured followed by GM and seeding.

2.5.1.8.3 Store-and-Release Cover C

The RCA proposes an alternative store-and-release cover for all overburden at the Rasmussen Valley Mine to provide additional protection of water quality resulting from infiltration and deep percolation of precipitation into and through the overburden. The store-and-release cover, called Cover C, would consist of three layers. The bottom layer would consist of 3 feet of alluvium salvaged from within the mine footprint (pit alluvium). The middle layer would consist of 2 feet of combined GM and alluvium salvaged from the external borrow sites (external GM). The top layer would consist of 1 foot of GM salvaged within the mine footprint (pit GM).

A variety of alternative covers were analyzed for performance along with Cover C. Among all the covers, Cover C has the highest transpiration rate (6.41 in/yr) of the alternatives considered and the second lowest net percolation rate (0.14 in/yr) after the geosynthetic clay laminated liner (GCLL) with 0.04 in/yr). Cover C has a much lower net percolation rate (0.14 in/yr) than the Proposed Action cover (2.4 in/yr). The runoff for Cover C (3.5 in/yr) is higher than that for the Proposed Action (1.4 inches). Cover C has the second lowest need for external borrow material, greater than that for the Proposed Action, but lower than that for most other alternatives. Like the Proposed Action, all of the required materials are available on or near the site and within the Lease. The coarser-grained GM top layer for Cover C has low erodibility.

2.5.1.8.4 GM Storage and Placement

GM would be salvaged from areas to be disturbed. Because GM is most efficiently handled in dry conditions, it would generally be salvaged during the period from summer to fall. Other than the previously discussed overburden cover (Cover C), GM would be distributed over areas that have been shaped and are ready to be revegetated to a depth of at least 12 inches. Cover C would require approximately 0.33 MBCY (0.37 MLCY) of GM for the top 12 inches in accordance with the cover design (BC 2015a). Approximately 1.62 MBCY (1.86 MLCY) of GM would be available from the disturbed and borrow areas for all reclamation (ARCADIS 2015d). Any excess GM would be used to supplement cover over other disturbances. The ultimate goal would be to maximize the recovery and return to multiple use of this resource. The GM would be graded into place with dozers, graders, or other equipment suitable to this purpose before revegetation.

GM salvaged on the P4 state lease would remain segregated from GM salvaged on the Rasmussen Valley Lease and would be used for reclamation on their respective mines. Commingling of GM materials between mines is not anticipated. Final determination of this would be controlled by material availability, material properties, and operational constraints.

2.5.1.8.5 Revegetation

Public scoping in March 2011 identified a possible alternative seed mix to be considered instead of or in addition to the seed mix specified in the Proposed Action. Public comments pointed out that there were reasons to consider several different seed mixes for different settings within the

Study Area to reestablish vegetative diversity and post-mining multiple land use goals. The seed mix identified in the Proposed Action (**Table 2.3-3**) considers differences in aspect and the associated differences in moisture regime. Subsequent vegetation baseline studies of the Study Area further evaluated elevation, soil characteristics, and slope as controlling factors in existing plant communities (BC 2012a). The alternative seed mix proposed for the RCA is shown in **Table 2.5-4**. This seed mix would be used on the Rasmussen Valley Mine portion of the RCA. Areas on the South Rasmussen Mine would be reclaimed in accordance with the South Rasmussen Mine Reclamation Plan Modification (P4 2014), including use of the approved seed mix specified therein.

Table 2.5-4 Alternative Seed Mixes (Rasmussen Valley Mine)

Scientific Name	Common Name	Recommended lbs/acre	% of Seed Mix
Grasses			
Bromus marginatus	Mountain Brome	2.00	5.3
Elymus elymoides	Bottlebrush Squirrel Tail	2.00	5.3
Elymus lanceolatus ssp *lanceolatus*	Thickspike Wheatgrass	1.00	2.6
Elymus lanceolatus ssp *psammophilus*	Streambank Wheatgrass	1.00	2.6
Elymus trachycaulus	Slender Wheatgrass	2.00	5.3
Festuca *I*dahoensis	Idaho Fescue	1.00	2.6
Festuca ovina	Sheep Fescue	1.00	2.6
Koeleria macrantha	Prairie Junegrass	0.25	0.7
Leymus cinereus	Great Basin Wildrye	2.00	5.3
Pascopyrum smithii	Western Wheatgrass	1.50	4.0
Poa secunda ssp ampla	Big Bluegrass	0.75	2.0
Pseudoroegneria spicata	Bluebunch Wheatgrass	2.00	5.3
Triticum aestivum x Secale cereale	Quickguard	3.00	7.9
	Grass Totals	**19.50**	**51.7**
Forbs			
Achillea millefolium var *occidentalis*	Western Yarrow	0.50	1.3
Heliomeris multiflora	Showy Goldeneye	0.50	1.3
Linum lewisii	Lewis Blue Flax	1.00	2.6
Lupinus argenteus	Silver Lupine	4.00	10.6
Penstemon palmeri	Palmer Penstemon	1.00	2.6
Penstemon strictus	Rocky Mountain Penstemon	1.00	2.6
	Forb Totals	**8.00**	**21.2**
Shrubs			
Artemisia cana	Silver Sagebrush	0.15	0.4
Artemisia tridentata ssp *vaseyana*	Mountain Big Sagebrush	0.10	0.3
Ceanothus velutinus	Snowbrush Ceanothus	1.00	2.6
Krascheninnikovia lanata	Winterfat	0.50	1.3
Purshia tridentata	Bitterbrush	4.50	11.9
Rosa woodsii	Wood's Rose	1.00	2.6
Symphoricarpos oreophilus	Mountain Snowberry	3.00	7.9
	Shrub Totals	**10.25**	**27.2**
	Overall Totals	**37.75**	**100.0**

Table 2.5-4 Alternative Seed Mixes (Rasmussen Valley Mine)

Scientific Name	Common Name	Recommended lbs/acre	% of Seed Mix
Alternate Species for Rasmussen Valley Mine Project Seed Mix*			
Grasses			
Bouteloua curtipendula	Sideoats Grama		
Nassella viridula	Green Needlegrass		
Forbs			
Artemisia frigida	Fringed Sagewort		
Balsamorhiza sagittata	Arrowleaf Balsamroot		
Gaillardia aristata	Blanket Flower		
Hedysarum boreale	Northern Sweetvetch		
Sphaeralcea coccinea	Scarlet Globemallow		
Penstemon cyaneus	Blue Penstemon		
Penstemon eatonii	Firecracker Penstemon		
Shrubs			
Amelanchier alnifolia	Saskatoon Serviceberry		
Potentilla fruticosa	Cinquefoil		
Rubus idaeus	American Red Raspberry		
Ribes cereum	Wax Current		
Ribes aureum	Golden Current		

Notes:

* If alternate species are selected to replace species on the approved list, the species would be replaced at an equal percentage of the overall mix as the removed species. Recommended seeding rate would be calculated accordingly.

2.6 NO ACTION ALTERNATIVE

CEQ regulations require that an EIS include a No Action Alternative. The phosphate Lease grants the lessee the exclusive right and privilege to explore for and mine the phosphate deposit on the leased land, subject to the conditions provided in the Lease. It also gives the lessee the right to use such surface of the leased land as may be necessary for the development of the phosphate resource. Phosphate leases are not cancellable by the U.S., except by due process where the lessee does not meet the terms and conditions of the Lease. Thus, the No Action Alternative does not imply that the Lease would never be developed, only that it would not be developed under the 2011 Mine and Reclamation Plan or alternatives evaluated in this Draft EIS.

Under this alternative, the project would not be approved for mining on the existing Lease or any associated development. Similarly, the lease modification request would not be approved. As a result, the No Action Alternative would not provide ore for the CPO and could result in reduced output or closure of the plant. Ore for the CPO would have to be obtained from other sources, and environmental effects might be greater or less than those associated with the Proposed Action. Because the rights to mine the leased phosphate deposits have been acquired, if the No Action Alternative were selected, another Mine and Reclamation Plan for this Lease could be submitted in the future.

2.7 AGENCY-PREFERRED ALTERNATIVE

At this time, the Agency-Preferred Alternative is the RCA because it employs measures to satisfy regulatory requirements and reduce potential environmental impacts, particularly to water quality. The RCA was selected because of:

- Elimination of permanent external overburden piles downslope of the mine and near already impacted surface water;
- Elimination of all temporary external Meade Peak overburden piles downslope of the mine and near already impacted surface water;
- Minimal wetland impacts across the entire project;
- Use of previously disturbed ground and existing infrastructure to the maximum extent practicable;
- Reduced water crossings;
- Reduced disturbed acres and visual impacts;
- Increased ridge-wide reclamation;
- Elimination of a proposed power line segment; and
- Increased public safety.

The RCA would reasonably accomplish the purpose and need for the federal action, while considering environmental, economic, and technical factors. While the Agencies have identified the RCA as the Agency-Preferred Alternative, consideration given to public comments on this Draft EIS may result in changes to this alternative.

The USACE is neither an opponent nor a proponent of the applicant's Proposed Action or alternatives. Decision options available to the USACE are to issue the permit as applied for, issue the permit with modifications or conditions, or deny the permit. The intent of the USACE is to ensure that the analysis of alternatives is thorough enough to use for the public interest review outlined in USACE regulations at 33 CFR 320 et seq and the 404(b)(1) guidelines (40 CFR part 230).

2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Several potential alternatives were considered for this analysis but were eliminated from detailed study for various reasons. These alternatives are listed below, and the reasons they were excluded from further consideration are described. **Figure 2.8-1** illustrates the footprints of several of the alternatives considered but dismissed, including: external overburden piles; external overburden backfill locations; GM stockpiles; ore haul roads; and power line corridors. Differences in design of features, such as cap and cover alternatives and underground vs. overhead power lines, are not shown on this figure. In addition, the ore conveyor system was evaluated as following HR-1. No alternative corridor was considered. Alternative elements that were incorporated into the design of the RCA, and are therefore not discussed as eliminated from detailed study, include off-site backfill of overburden to the South Rasmussen Mine, HR-4, and use of generators to supply power to the mine operations and facilities.

North Rasmussen Ridge Mine (Off-Site Backfill Alternative)

North Rasmussen I-07619

Rasmussen Ridge I-04375

South Rasmussen State Lease #7958

P4 South Rasmussen Mine

South Rasmussen Fringe I-023658

Proposed Action Pit Backfill

Rasmussen Valley I-05975

Private Parcels Considered for Off-Lease Overburden Pile

Wooley Valley Panel F I-0-015040

Wooley Valley Mine Pit (Off-Site Backfill Alternative)

Wooley Valley Tipple Area

Proposed Off-Lease Overburden Pile Alternative and GM Stockpile Alternative

Lanes Creek County Road

Diamond Creek County Road

Dayes Creek

Sheep Creek

Rasmussen Creek

No Name Creek

Blackfoot River

Corraillsen Creek

Browns Canyon Creek

Bacon Creek

Diamond Creek

Spring Creek

Mill Canyon Creek

Lanes Creek

Caribou National Forest

Dayes Range

Rasmussen Ridge

Dry Valley

Indian Valley

LEGEND

- STUDY AREA
- P4 SOUTH RASMUSSEN MINE
- WOOLEY VALLEY TIPPLE AREA
- BLM PHOSPHATE LEASE
- SOUTH RASMUSSEN STATE LEASE #7958
- PROPOSED ACTION PIT AREA
- PROPOSED GM STOCKPILE FOR HAUL ROAD-1 (2011 MINE PLAN)
- PROPOSED GM STOCKPILE FOR HAUL ROAD-2 ALTERNATIVE
- PROPOSED GM STOCKPILE FOR HAUL ROAD-3 ALTERNATIVE
- PRIVATE PARCELS CONSIDERED FOR OFF-LEASE OVERBURDEN PILE
- PROPOSED OFF-LEASE OVERBURDEN PILE ALTERNATIVE AND GM STOCKPILE ALTERNATIVE
- PROPOSED ACTION COUNTY ROAD REALIGNMENT

ORE HAUL ROAD ALTERNATIVES

- HAUL ROAD-1 (2011 MINE PLAN)
- HAUL ROAD-2 ALTERNATIVE
- HAUL ROAD-3 ALTERNATIVE
- SHARED BY HAUL ROADS-1 AND 2
- SHARED BY HAUL ROADS-1 AND 3
- SHARED BY HAUL ROADS-1, 2, AND 3
- BACKFILL HAUL ROAD: COMMON SEGEMENT*
- PROPOSED POWERLINE ALTERNATIVE
- PROPOSED POWERLINE (2011 MINE PLAN)
- EXISTING POWERLINE
- INTERMITTENT STREAM
- PERENNIAL STREAM

* THE BACKFILL HAUL ROADS START ALONG THE ORE HAUL ROAD ALTERNATIVES, BUT THEN BRANCH OFF.

Projection:
North America Datum 1983,
Universal Transverse Mercator, Zone 12 North
Source:
USATopo Map, serviced by ESRI ArcGIS Online, accessed on 9/3/2015.

NORTH

0 0.8 1.6 Miles

RASMUSSEN VALLEY MINE

FIGURE 2.8-1
Alternatives Not Carried Forward

ANALYSIS AREA: Caribou County, Idaho	
Date: 9/3/2015	Prepared By: JC
File: K\CO1553\2015_DEIS\Alternatives_NotCarriedForward.mxd	

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2.8.1 Store Meade Peak-containing Material in External Overburden Piles

Alternative Considered: Under this alternative, Meade Peak-containing material would be placed in permanent external overburden piles instead of directly into the pit as backfill or re-handling the material from temporary external overburden piles to the backfill areas. Placing this material in permanent external overburden piles directly as it is removed from the pits would reduce the number of times the material is handled and transported.

Reasons Considered: This alternative was considered in response to issues about potential release of selenium and other COPC loading to surface water and groundwater. Handling 4.6 million cubic yards of Meade Peak-containing material multiple times could increase the potential for releases of selenium and other COPCs into the environment.

Reasons Dropped: This alternative was eliminated from detailed consideration because it would also introduce unnecessary additional risks of selenium release into the surrounding environment and increase potential post-mining liabilities. The RCA provided an alternative location to store the overburden.

2.8.2 Alternate On-Lease External Overburden Storage

Alternative Considered: Under this alternative, alternate external overburden storage would be developed in other areas of Agrium's Lease. This development would relocate the external overburden storage to areas potentially less vulnerable to geotechnical issues or farther away from areas sensitive to release of COPCs.

Reasons Considered: This alternative was considered in response to issues about geotechnical pile stability and potential release of selenium and other COPC loading to surface water and groundwater from overburden material stored in the external overburden piles in the Proposed Action.

Reasons Dropped: This alternative was eliminated from detailed consideration because no suitable alternative locations could be made available on the Lease without reducing or eliminating currently identified mine features. In addition, there are potential issues with geotechnical stability at the potential sites for the additional external overburden storage piles. The RCA provided an alternative location to store the overburden.

2.8.3 Off-Lease External Overburden Storage in Rasmussen Valley

Alternative Considered: Under this alternative, the permanent external overburden storage piles would be located lower in Rasmussen Valley near Angus Creek. Areas considered included Agrium's private land in the southeast portion of the mine area, which has also been identified as a lease modification, and two parcels of private land in Rasmussen Valley near the proposed haul road alignments. In addition, the two potential permanent external overburden storage sites on the lease modification were also considered for placement of temporary overburden piles.

Reasons Considered: This alternative was considered in response to concerns about the potential geotechnical stability of on-lease locations for the permanent external overburden piles and the potential water impacts.

Reasons Dropped: This alternative was eliminated from detailed consideration because the two private land parcels in Rasmussen Valley that are large enough to accommodate overburden piles and located near proposed haul road alignments include extensive areas of delineated wetlands, would require crossing Angus Creek to transport the overburden to the overburden piles, and would permanently alter the land use in Rasmussen Valley. These overburden locations would increase the area of disturbance, including disturbance to wetlands or AIZs, increase dust emissions and fuel consumption, and would provide no reduction in environmental effects. Overburden storage in any of these locations would alter the visual landscape, affect grazing, and affect recreation. This would be a long-term change to land use and could affect other nearby resources.

The two potential permanent external overburden storage sites on the lease modification that were considered for placement of the temporary overburden pile would affect 0.65 acre of wetlands. In addition, these locations would be on a basalt bench close to the Blackfoot River, would require additional water management and protective measures, and would introduce additional risks of selenium release into the environment.

The RCA provided an alternative location to store the overburden.

2.8.4 Relocate External Overburden to Off-site Backfill Locations

Alternative Considered: Under this alternative, the permanent external overburden storage piles would be eliminated. Instead, the overburden material would be placed in areas of previous mine disturbance outside of the areas of disturbance delineated in the Proposed Action. Areas considered for off-site storage of overburden included Rasmussen Ridge Mines and Wooley Valley Mine. These alternatives differ from the permanent external overburden piles in the Proposed Action because they would use previously disturbed (mined) areas for overburden storage and would involve longer haul cycles to transport the overburden off site.

Reasons Considered: This alternative was considered in response to concerns about the potential geotechnical stability of proposed locations for the permanent external overburden piles.

Reasons Dropped: This alternative was eliminated from detailed consideration because permanent storage of overburden at the North Rasmussen Ridge or Wooley Valley Mines is not reasonable.

At the Rasmussen Ridge Mines, an open pit would remain at the end of mining in 2016 that could accommodate all of the proposed external overburden from the project. Haul cycles, however, would be greater than for Wooley Valley Mine. The additional truck traffic, including traffic on shared segments of the haul road, would add to fuel consumption, air emissions, traffic hazards, and safety issues.

Mining at Wooley Valley occurred from 1974 to 1989, and an open pit remains in Panel F on BLM land. Haul Roads HR-1, HR-2, HR-3, and HR-4 all connect the proposed mine to the Wooley Valley Tipple Haul Road, which passes by the north entrance of the former Wooley Valley Mine. Like the other two mines, use of the Wooley Valley Mine would add haulage for overburden disposal. The additional truck traffic, including traffic on shared segments of the haul road, would add to fuel consumption, air emissions, traffic hazards, and safety issues.

The RCA provided an alternative location to store the overburden.

2.8.5 Store-and-Release Cover A

Alternative Considered: Store-and-Release Cover A would consist of 1 foot of external area GM over 2 feet of pit GM over 4 feet of pit alluvium and colluvium. The layers of pit and external area GM store water to enhance evapotranspiration and support vegetation. The thick layer of alluvium and colluvium would reduce the risk of plant uptake of harmful constituents from the overburden. Cover A would use the most accessible external borrow material. Construction would be somewhat more technical for Cover A than for the Proposed Action Cover because of the layered system. This cover would use fine-grained external area GM as the uppermost layer. This top layer would initially reduce infiltration into the soil profile, but would increase runoff and the risk of soil erosion. Therefore, the timely implementation of adequate erosion control measures and post-construction monitoring would be essential to establishing a healthy vegetative cover necessary for long-term effectiveness and durability of the cover.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: Cover A was dropped because it was determined that the initial low permeability of the top 12 inches would weather to a more permeable layer, allowing additional infiltration, which would not be able to be transpired by the revegetation. The result would be net percolation rates and subsequent groundwater impacts similar to those associated with the Proposed Action. The RCA Cover C provides a more protective cover.

2.8.6 Store-and-Release Cover B

Alternative Considered: Store-and-Release Cover B would consist of 2 feet of pit GM over 4 feet of low hydraulic conductivity external area alluvium and colluvium. The pit GM at the surface would provide storage and support vegetation, while the external area alluvium and colluvium was intended to impede deep percolation and provide hydraulic storage and sequestration of the backfill. The use of coarse-grained pit GM at the surface would result in a less erodible surface than Cover A.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: Cover B would have a higher net percolation and a lower efficacy-to-cost ratio than Cover A. Constructability would be similar to that of Cover A; however, this cover would require the largest quantity of external borrow material (double to quadruple the amount associated with other alternatives) and would result in the largest borrow disturbance area (about double the area of the other alternatives) and haul volumes. Because this cover would use the coarser-grained pit GM as the uppermost layer, it would be less prone to erosion than Cover A. This alternative was eliminated from detailed evaluation because it was determined that the two feet of pit GM and 4 feet of external alluvium and colluvium would not retard the percolation in the root zone enough for the revegetation to transpire sufficient amounts of water before the water passed beyond the root zone and into the overburden. The result was a relatively high net percolation rate and a large areal extent of disturbance for the borrow material required. The RCA Cover C provides a more protective cover.

2.8.7 Capillary Break Cover

Alternative Considered: The Capillary Break Cover is a store-and-release cover with the addition of a coarse-grained layer immediately below the root zone. The interface between the upper fine layer and the lower coarse layer increases the storage capacity of the upper layer by increasing the saturation level required for drainage. The greater moisture storage in the GM layer allows plants more time to transpire soil moisture, thus preventing it from continuing down as deep percolation. This alternative was initially included in the analysis as 2 feet of pit GM over 1 foot of non-Meade Peak-containing material over 4 feet of pit alluvium and colluvium.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: This alternative was not analyzed in initial percolation modeling because no on-site borrow material was found with the appropriate coarse particle size properties that would provide a capillary break effect. Consequently, this cover could not be constructed with on-site materials.

2.8.8 Compacted Alluvium Barrier Layer Cover

Alternative Considered: The Compacted Alluvium Barrier Layer Cover (Compacted Barrier Cover) would consist of 2 feet of pit GM over a filter fabric over 1 foot of non-Meade Peak-containing material over a 2-foot layer of compacted external area alluvium and colluvium. The compacted alluvium and colluvium layer would act as a low-permeability barrier. The compacted barrier layer would reduce percolation into the underlying overburden. The non-Meade Peak-containing material would serve as a drainage layer above the barrier layer and provide lateral drainage to prevent oversaturation of the GM. Without the drainage layer, oversaturation could result in increasing pore water pressures that could compromise the stability of the cover soil, causing it to slide. The layer of pit GM would provide hydraulic storage and support vegetation.

Reasons Considered: This alternative was considered to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater.

Reasons Dropped: The Compacted Barrier Cover ended up having the highest net percolation rate of the alternative covers considered (2.48 inches per year). This alternative also would have the lowest efficacy-to-cost ratio and most complicated construction of the native material alternatives. This alternative also ranked poorly because of the large volume of external borrow material that would be needed, the necessary crushing and screening of non-Meade Peak-containing material from the pit for a drain layer, and the infeasibility of installing the cover system in phases consistent with the concurrent reclamation because of the use of internal stockpiles. The drainage layer and overlying filter fabric that would be needed to prevent plugging of the drainage layer would complicate the long-term durability of this cover. This alternative was eliminated from detailed evaluation because of its high net percolation rate and concerns about the long-term stability and performance of the filter fabric and drainage layer. The RCA Cover C provides a more protective cover.

2.8.9 Geosynthetic Clay Liner Laminate Synthetic Cover

Alternative Considered: The GCLL Cover would use a bentonite synthetic barrier to reduce percolation of water through the cover system into the underlying backfill. It would consist of 2 feet of pit GM over a filter fabric over a drainage layer of 1.5 feet of non-Meade Peak-containing material over a GCLL over a bedding layer of 1 foot of compacted external area alluvium and colluvium. The GCLL barrier layer consists of a layer of sodium bentonite contained between two geotextile fabrics with a high-density polyethylene (HDPE) flexible membrane adhered to the upper side. The HDPE layer ensures that desiccation and adverse cation exchange do not occur and provides for a substantial reduction in percolation rates beyond the simple bentonite alone. GCLLs are considered to provide enhanced resistance to penetration by plant roots or burrowing animals by providing an extra layer of protection, in addition to its self-sealing qualities. The non-Meade Peak-containing material would provide lateral drainage to prevent slab failure of the cover that can result from oversaturation of the GM. The compacted alluvium and colluvium would provide a bedding layer under the GCLL to prevent damage. The layer of pit GM would provide hydraulic storage and support vegetation.

Reasons Considered: This alternative was considered as an option to address concerns about percolation of meteoric water through the backfill and potential effects to surface water and groundwater and to establish a reclaimed vegetative environment supporting healthy multiple land use.

Reasons Dropped: Although the GCLL Cover would have the lowest net percolation, it would have a very low efficacy-to-cost ratio and would be the most technically challenging to construct. This cover would have substantially more complex construction associated with the haulage and compaction of external borrow material for the bedding layer, installation of the GCLL on steep slopes, crushing and screening of non-Meade Peak-containing material from the pit for a drain layer, and installation of the cover system in phases consistent with the concurrent reclamation. The synthetic materials and potential plugging of the drainage layer would complicate the long-term performance and durability of this cover. The ability to maintain a diverse vegetative cover, given the relatively thin root zone, is also a concern with this type of cover. This alternative was eliminated from detailed evaluation because of its technical challenges for construction, and very high costs to construct and maintain.

2.8.10 Alternative Overhead Power Line

Alternative Considered: The alternative overhead power line would have connected with the existing power line east of the mine and west of Lanes Creek County Road. The alternative overhead power line would have been 1,183 feet longer than the Proposed Action power line, but would not cross the Blackfoot River or wetlands in the floodplain of the Blackfoot River. The west end of the power line would have paralleled the West Side Haul Road and would have been constructed at the same time.

Reasons Considered: This alternative was considered in response to concerns about effects of the Proposed Action power line to wetlands, riparian areas, and AIZs along the upper Blackfoot River.

Reasons Dropped: If north-south mine sequencing were used, the West Side Haul Road would not be constructed until later in the mine development. Consequently, disturbance associated with the power line construction would not be concurrent with the haul road construction. This alternative power line element would offer minimal benefit by itself and would not have the flexibility of relocation that would be provided by portable generators. The power line would also pose more extensive physical impacts than portable generators and would cross several small drainages. No other alternative elements are currently being proposed that would combine with the alternative overhead power line to make a reasonable alternative. This alternative was eliminated from detailed consideration because the reduction of effects to wetlands in the floodplain of Blackfoot River for this alternative in comparison to the Proposed Action power line was not sufficient to consider it a reasonable alternative for detailed evaluation.

2.8.11 Underground Power Line along the Proposed Corridor

Alternative Considered: Under this alternative, a temporary underground power line would be constructed instead of an overhead power line. It would follow the same corridor as the proposed overhead power line. The underground line would require a continuous corridor of disturbance for construction and an 80-foot-wide cleared and maintained corridor for maintenance.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to adversely affect terrestrial and avian wildlife.

Reasons Dropped: This alternative was eliminated from detailed consideration because installation of the underground power line would result in greater adverse effects than construction of the overhead power line. Disturbance of the required 80-foot-wide corridor would adversely affect biological resources present in the corridor where an overhead line could span small sensitive areas, such as drainages and wetlands. Particular problem areas for an underground line would be crossing small drainages, crossing wetlands, crossing the Blackfoot River, and installation in areas where basalt flows are at or near the ground surface. Crossing the Blackfoot River would require either directional

drilling under the river or spanning the river with a segment of overhead line. Installation of the underground line across the basalt flow would require drilling and blasting. Finally, underground lines are less reliable, more difficult and costly to maintain, and potentially dangerous to public safety.

2.8.12 Underground Power Line along the Alternative Corridor

Alternative Considered: Under this alternative, a temporary underground power line would be constructed instead of an overhead power line. The underground line would require a continuous corridor of disturbance for construction and an 80-foot-wide cleared and maintained corridor for maintenance.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to affect terrestrial and avian wildlife adversely.

Reasons Dropped: This alternative was eliminated from detailed consideration because installation of the underground power line would result in greater adverse effects than construction of the overhead power line. Disturbance of the 80-foot-wide corridor would adversely affect biological resources present in the corridor, where an overhead line could span small sensitive areas, such as drainages and wetlands. Although the line would not cross any substantial areas of wetlands, the Blackfoot River, or areas where basalt flows are at or near the ground surface, it would cross a number of small intermittent drainages. This alternative would avoid some of the potential effects of the buried line along the proposed alignment, but would still result in additional environmental effects in comparison to an overhead power line along the same corridor. Finally, underground lines are less reliable, more difficult and costly to maintain, and potentially dangerous to public safety.

2.8.13 Generation of Renewable Energy

Alternative Considered: Under this alternative, geothermal and wind generation were considered as potential options for supplying power to the mine facilities. Use of geothermal and wind generation would eliminate the need for the power line to the mine.

Reasons Considered: This alternative was considered in response to concerns raised about the potential for the overhead power line to adversely affect terrestrial and avian wildlife.

Reasons Dropped: This alternative was eliminated from detailed consideration because operations would be conducted 24 hours per day and would require a constant source of power. No potential sources of renewal energy exist that could provide the continuous power required for the project. Sufficiently sized geothermal power facilities are available, but they require natural geothermal resources. Although some evidence of water with elevated temperatures has been noted in groundwater monitoring wells near the south end of the Study Area, no geothermal resources occur in the area. In addition, wind generation would require the

installation of at least one wind turbine generator. Climatological data for the Study Area suggest that the average velocities of wind may be adequate, but that winds are too intermittent to meet the project requirements for continuous power.

2.8.14 Ore Conveyor System

Alternative Considered: Under this alternative, a conveyor would be constructed to transport ore across Rasmussen Valley from the north end of the proposed mine pit to the existing ore haul road. The conveyor could be constructed along the alignment of HR-1. The alignment would be approximately 15,000 feet long, running from the north end of the proposed mine pit to the existing ore haul road. The conveyor system would consist of a maintenance road along the conveyor system; ore stockpile, staging, loading, and unloading areas at each end of the conveyor; and GM stockpiles and sediment catchment basins along the area of disturbance. Haul trucks would still be necessary at both ends of the conveyor to move ore from the mine to the conveyor and from the conveyor to the Wooley Valley Tipple. Following the same corridor as HR-1, the conveyor would cross Rasmussen Valley Road, Angus Creek, and the same areas of wetlands. The corridor of disturbance would be approximately 40 feet wide.

Reasons Considered: This alternative was considered in response to concerns about adverse effects of the haul road on wetlands and on surface water at stream crossings and segmentation of grazing allotments along the proposed haul road.

Reasons Dropped: Construction of the conveyor would not reduce the effects to wetlands sufficiently because of the required maintenance road; it would disturb 10.3 acres (BC 2013a) of wetlands along HR-1 (compared to 20.5 acres for the haul road). The conveyor, however, would cross large areas of private land (4,400 feet along HR-1 and 6,600 feet along HR-2) and disrupt the landowner's use of these areas. In addition, the conveyor would be a constant source of noise and fugitive dust, would disrupt wildlife, would fragment wildlife habitats, and would be a barrier to the movement of wildlife and livestock. Finally, the conveyor system would be unduly expensive to construct and operate considering the short life-of-mine. The shorter new haul road, HR-5, in the RCA avoids the impacts that would be incurred by the conveyor or Proposed Action haul road.

2.8.15 Ore Haul Road HR-2

Alternative Considered: Under this alternative, the Rasmussen Valley Haul Road would be moved to the south edge of Rasmussen Valley. The alternative would cross the same two landowner parcels as HR-1 (eastern [7S/44E] and western [6S/43E]), but for a shorter distance on the western parcel. This alternative haul road also would cross Rasmussen Valley Road at just one location, compared to the two locations where HR-1 crosses the road.

Reasons Considered: This alternative was considered in response to concerns about the extent of potential adverse effects to wetlands.

Reasons Dropped: This alternative was eliminated from detailed consideration because the reduction of impacts for this alternative in comparison to HR-1 was not sufficient to consider it a reasonable alternative. It does not provide sufficient additional environmental benefit compared to other alternative haul road routes. Although the impacts on wetlands would be less than those for HR-1, they would still be considered significant. The cycle time for hauling ore from the mine to the Wooley Valley Tipple would be nearly the same, which eliminates any operational benefits of reduced fuel consumption or associated air emissions for this haul road alignment. Crossing of a public road by a haul road would create public safety concerns. The shorter new haul road, HR-5, in the RCA avoids the impacts that would be incurred by HR-2 or Proposed Action haul road.

2.8.16 Ore Haul Road HR-3

Alternative Considered: HR-3 would have followed the lower slopes of Rasmussen Ridge northwest to the Wooley Valley Tipple Haul Road. It would have avoided the wetlands along Angus Creek as well as avoiding crossing Rasmussen Valley Road. It would also cross less private land than the Proposed Action Haul Road, but would cross more state lands managed by the IDL.

Reasons Considered: This alternative haul road was considered in response to concerns about the extent of potential adverse effects to wetlands along Angus Creek.

Reasons Dropped: This alternative would not reduce the travel distance to the existing Agrium mine facilities at the Rasmussen Ridge Mines, and would increase the haul cycle to the Wooley Valley Tipple in comparison to the Proposed Action. This alternative would generate more dust emissions, and would result in higher fuel consumption and air emissions in comparison to HR-1. This alternative element does have fewer potential effects on wetlands in comparison with the Proposed Action, and does not cross Rasmussen Valley Road, reducing potential effect on public roads. However, it does not address other issues such as effects on air quality, water resources, soils, wildlife, and visual resources. This alternative was eliminated from detailed consideration because the reduction of impacts for this alternative in comparison to HR-1 and HR-5 was not sufficient to consider it a reasonable alternative for detailed evaluation. The shorter new haul road, HR-5, in the RCA avoids the impacts that would be incurred by HR-3 or Proposed Action haul road.

2.9 ALTERNATIVE COMPARISON AND EFFECTS SUMMARY

Table 2.9-1 provides a summary and comparison of potential effects from the Proposed Action and alternatives by resource. Detailed descriptions of potential effects for specific resources are presented in **Chapter 4**.

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Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Geology, Minerals, and Paleontology			
Geotechnical Stability	The North and South Main Overburden Piles could be affected by slope instability. An indirect effect of slope failure would be exposure of Meade Peak overburden. In addition, 30.6 acres of haul roads constructed on soil map units HAX and PCM may be susceptible to minor cut slope failure. Overall potential effects of slope and pit wall instability under the Proposed Action would be short-term and minor.	Under the RCA, there would be no permanent external overburden piles on potentially unstable slopes downslope of the mine pit. The West Side Haul Road and HR-5 would be constructed on 31 acres of soil map units HAX and PCM and may be susceptible to minor cut slope failure. Portions of HR-5 would carry a higher potential for minor failure than the Rasmussen Valley HR-1. Overall potential effects of slope and pit wall instability under the RCA would be negligible.	The mine would not be developed and there would be no potential for geotechnical effects from this action.
Paleontology	Geological strata that would be mined are classified under the BLM Potential Fossil Yield Classification (PFYC) system (BLM 2007) as PFYC 5a and PFYC 3a. PFYC 5a deposits have a very high potential to contain scientifically significant fossils. PFYC 3a deposits have a moderate potential to contain scientifically significant fossils. However, the paleontological resources in these formations are commonly occurring invertebrate fossils not generally considered to be important or restricted to the analysis area. The Proposed Action would disturb 126 acres of PFYC Class 5a deposits and 23 acres of PFYC Class 3a deposits. With required mitigation, effects to paleontological resources	The RCA would disturb 150 acres of PFYC Class 5a deposits and 43 acres of PFYC Class 3a deposits. With required mitigation, effects to paleontological resources would be minor. The RCA could have a beneficial effect for paleontology through the discovery and documentation of previously undocumented paleontological resources. Overall, the effects to important paleontological resources would be long-term and minor.	The mine would not be developed and there would be no potential for effects to paleontological resources from this action.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	would be minor. Mitigation would be developed on a case-by-case basis and may include salvage of important specimens Overall effects to paleontology under the Proposed Action would be long-term and minor.		
Air Resources, Climate and Noise			
Air Emissions	Activities at the Rasmussen Ridge Mine would gradually conclude as equipment is moved to develop the Rasmussen Valley Mine. The Proposed Action would replace comparable existing activities at the Rasmussen Ridge Mine. The majority of air emissions are from fugitive dust and equipment emissions. Similar levels to those currently occurring would occur during operation of the Proposed Action. The impacts from the Proposed Action to air resources would be negligible.	The RCA eliminates overburden piles downslope of the pit and reduces the frequency of overburden pile disturbance. The total surface disturbance of the RCA would be approximately 40 acres less than the Proposed Action. HR-5 would be approximately 3 miles longer than the Proposed Action HR-1, increasing vehicle emission, but the overall potential air emissions would be lower than those for the Proposed Action. The impacts from the RCA to air resources would be negligible.	Under the No Action Alternative direct impacts to air emissions from the activities in the Proposed Action would not occur. Air emissions would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.
Climate Change	Greenhouse gas (GHG) emission from the Rasmussen Valley Mine operations would be similar to those from the current operations at Rasmussen Ridge Mine. These emissions are lower than the current USEPA reporting threshold of 25,000 metric tons in combined GHG emissions per year. Effects of the Proposed Action on	Potential contribution to climate change from the RCA would not change from those described for the Proposed Action. The effects of the RCA on climate change would be negligible.	Under the No Action Alternative direct impacts to climate change from the activities in the Proposed Action would not occur. GHG emissions would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	GHG emissions and climate change would not be different from existing conditions and would not continue after the mine is closed. The effects of the Proposed Action on climate change would be negligible.		
Noise	Noise from operation of the Proposed Action would be generated by site equipment, blasting, drilling and traffic. The overall mine generation noise profile would be minimally changed from current activities at the Rasmussen Ridge Mine. The noise profile would be unchanged from the existing conditions, and changes in the locations of noise generating activities would be negligible at all off-site receptors. The noise effects from the Proposed Action would be negligible or minor at the closest residence as a result of the distance from the mine.	Potential impacts of noise under the RCA would be the same as those for the Proposed Action. The noise impacts from the RCA are expected to be negligible or minor at the closest residence as a result of the distance from the mine.	Under the No Action Alternative direct impacts to noise from the activities in the Proposed Action would not occur. Mining related noise would be reduced from existing conditions as activities conclude at the Rasmussen Ridge Mine.
Water Resources			
Groundwater Quantity	Pit dewatering under the Proposed Action to facilitate mining below the regional groundwater table near the southern end of the excavation is expected to result in moderate but localized impacts to water levels in the Wells Regional Aquifer for about 10 to 11 months starting during Phase 1 mining. The projected maximum drawdown in the Wells Regional Aquifer would be approximately 60 feet.	The RCA would result in reduced effects to groundwater quantity in comparison to the Proposed Action. The RCA would eliminate mining below the water table, reduce the pumping of pit water through un-reclaimed backfill, and eliminate external overburden piles downslope of the pit thus eliminating the reduced infiltration to shallow groundwater. The RCA would also use a cover system	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to water resources beyond the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Capping of the permanent overburden piles and pit backfill would permanently reduce the amount of recharge reporting to groundwater by approximately 8 percent from a pre-mining 2.6 inches per year to a predicted permanent 2.4 inches per year. Long-term decreases in shallow groundwater levels by reduced infiltration through reclaimed areas would be minor and localized and in the Wells Regional Aquifer would be negligible.	over the backfill and overfill that has lower infiltration characteristics. Numerical infiltration and seepage modelling of the RCA cover calculated a net percolation of 0.14 inch per year. Because of the elimination of mining below the water table, the elimination of the overburden piles downslope of the mine pit, the effects of the RCA to groundwater quantity would be negligible and less than the Proposed Action.	
Surface Runoff and Flow	The Proposed Action may affect surface waters by changes in the volume and timing of surface runoff and flow patterns The Proposed Action would increase hydrologic disturbance in the Angus Creek-Blackfoot River sub-watersheds by 1.59 percent. This would raise the total hydrologic disturbance in the Angus Creek-Blackfoot sub-watershed to 25.18, which is below the USFS guideline of 30 percent. There would be no disturbance on Forest Service lands in the Lower Lanes Creek or Diamond Creek sub-watersheds. Impacts to watershed area disturbance would be minor, local and long-term, lasting until vegetation has fully re-established and trees have reached the sapling/pole size class.	The RCA would increase hydrologic disturbance in the Angus Creek-Blackfoot River sub-watersheds by 1.65 percent during mining. The total new hydrologic disturbance would be 0.06 percent higher than that under the Proposed Action in the Angus Creek-Blackfoot River sub-watershed, and would be the same as the Proposed Action for the Lower Lanes Creek and Diamond Creek sub-watersheds. The total hydrologically disturbed area would meet the USFS guideline of less than 30 percent in all three sub-watersheds. Runoff reduction under the RCA would be 4.06 percent in the Angus Creek-Blackfoot sub-watershed, 2 percent lower	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to water resources above the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Reduction of runoff resulting from the Proposed Action would be 4.14 percent in the Angus Creek-Blackfoot River and 0.03 percent in the Lower Lanes Creek sub-watersheds. There would be no change in the Diamond Creek sub-watershed. Total runoff reduction to Blackfoot River would be less than 1 percent. Impacts to runoff reduction would be considered minor to negligible, local, and limited to the duration of mining. Haul roads carry the potential to affect peak flows through the diversion of flow through in-slope ditches and cross-drains, and through potential constrictions of flow at stream crossings or culverts. Potential alterations to peak flow would be minor, local and short-term. Long-term effects to streamflow from haul roads would be negligible. The permanently realigned county roads would have minor, localized impacts that would be long-term. Construction of four overburden piles downslope of the pit would alter the natural flow patterns by diverting the flow away from the natural channels. Although the intermittent drainages affected by two of the piles would be re-established after reclamation, the drainages affected by the North and South-South Overburden piles would be permanently diverted. Pit dewatering under the Proposed	than under the Proposed Action. Differences in runoff reduction to Blackfoot River between RCA and Proposed Action would be negligible. Total runoff area reduction compared to the Proposed Action would be 4.06 percent of the Angus Creek-Blackfoot River sub-watershed. Potential impacts to alterations in peak flow under the RCA would be the same as those for the Proposed Action. While there would be up to four external GM stockpiles constructed within intermittent drainages downslope of the mine pit, these would all be reclaimed after the cessation of the mining activities and there would be no permanent diversions from original stream channels under the RCA. There would be no impacts from dewatering under the RCA because there would be no mining below the water table. Consequently, there would be no drawdown in the aquifer and there would be no indirect effects to streamflows.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Action to facilitate mining below the regional groundwater table near the southern end of the excavation is expected to result in moderate but localized impacts to water levels in the Wells Regional Aquifer for about 10 to 11 months starting during Phase 1 mining. The projected maximum drawdown in the Wells Regional Aquifer would be approximately 60 feet. Temporary drawdown of shallow groundwater levels west of the pit near Angus Creek is predicted to be negligible. Dewatering is not predicted to measurably affect Angus Creek and Blackfoot River streamflows. However some minor, localized, temporary stream depletions may occur at lower reach of Springs Creek.		
Groundwater Quality	The Proposed Action could affect groundwater quality by the introduction of pollutants such as sediments, selenium and other COPCs. Potential impacts to water resources were evaluated using numerical models to estimate seepage rates from the proposed mine facilities and to simulate the transport of COPCs in groundwater. The Proposed Action would include three overburden piles (North, South Main, and South-South) an optional ore stockpile downslope of the mine pit and the backfilled pit. Percolation of meteoric water through the piles	The RCA would include no overburden piles or ore stockpiles downslope of the mine pit. All overburden would be backfilled into the existing South Rasmussen Mine pit or the mined-out Rasmussen Valley Mine panels and upslope overfill piles. COPCs would be released from the smaller area of pit backfill and overfill. Installation of the RCA cover over the backfill and overfill would reduce seepage to the Wells Regional Aquifer compared to the Proposed Action.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to water resources above the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	and backfill would generate seepage with elevated concentrations of selenium and other COPCs that could be released into groundwater. Many COPCs are likely to be mobile in seepage from the overburden, backfill and ore storage facilities at levels of regulatory concern. The Proposed Action would result in moderate impacts to groundwater quality in the local-, intermediate- and regional-scale aquifers. Seepage from mine facilities would result in increased loading of selenium and other COPCs to the Wells Regional Aquifer and the local and intermediate scale aquifers. These COPCs would be transported northwest in the Wells Regional Aquifer and southwest in the local and intermediate-scale aquifers, forming plumes with higher COPC concentrations than the unaffected groundwater. Seepage and groundwater movement through the backfilled pit would also result in the release of COPCs into the Wells Regional Aquifer at concentrations that exceed Idaho groundwater quality standards. Overall effects to groundwater quality under the Proposed Action would be long-term and minor.	Elimination of external overburden piles downslope of the pit would eliminate impacts from COPC loading to shallow and intermediate groundwater as well as surface water. The RCA would also result in reduced loading of COPCs to Wells Regional Aquifer compared to the Proposed Action. The impact to the intermittent and local aquifers would be negligible.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Surface Water Quality	Short-term effects to surface water quality could occur from increased sediment yield from disturbances related to construction resulting in increased suspended sediment and turbidity. These sources of sediment would be controlled by the use of BMPs, sediment control structures, and slope stabilization. There would be no long-term effects. Cover systems on the backfill and overburden piles would prevent contact of runoff with overburden preventing direct contamination of surface water by selenium and other COPCs. The Proposed Action would result in negligible, local and short-term impacts to surface water quality. Numerical infiltration and seepage modeling of the Proposed Action cover calculated a net percolation of 2.4 inches per year. Although substantially mitigated by the cap and cover system, meteoric water that infiltrates the pit backfill and overburden piles may result in moderate COPC loading to the alluvial aquifer, where the COPCs would be transported west in groundwater toward Angus Creek. However, gain-loss studies and surface water monitoring data indicate that the lower sections of Angus Creek lose flow to groundwater under most flow conditions. The COPCs transported in groundwater from the facility may be	Potential impacts to water quality from sedimentation and runoff under the RCA would be the same as those for the Proposed Action.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to water resources above the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	attenuated by dilution, precipitation, or adsorption. The Proposed Action would result in the release of COPCs into the Wells Regional Aquifer at concentrations that exceed Idaho groundwater quality standards. Impacts to surface water quality would be considered minor to moderate and long term.		
Soils			
	Direct impacts to soils from mining and construction include increased erosion; soil compaction; decreased soil productivity; and potential contamination of soils from chemical spills during transport, storage, or use. Indirect impacts to soils are not expected. Except for contamination by spills, these impacts would decrease soil productivity by impacting soil structure, increasing runoff and soil loss, decreasing permeability and infiltration, and damaging soil microorganisms. Overall direct impacts from construction of the Proposed Action would be moderate, local and long-term. The Proposed Action would create 440 acres of surface disturbance. Approximately 422.5 acres would be reclaimed. The remaining 17.5 acres would include unreclaimed pit walls and permanently realigned county roads. Reclamation would reduce the long-term impacts to minor.	Impacts to soils under the RCA would be the same as those described for the Proposed Action. The intensity of effects would be slightly different than the Proposed Action in response to differences in location and extent of disturbances. The total area of surface disturbance under the RCA would be 400 acres, 40 acres less than the Proposed Action. Approximately 381 acres of this disturbance would be reclaimed. As in the Proposed Action, unreclaimed areas would consist of unreclaimed pit walls and permanently realigned county roads. The RCA would also create less disturbance on soils with moderate or high erosion hazards. Areas outside the mine pit, overburden stockpiles and roads would be used as borrow areas for GM and alluvium to construct the RCA Cover C.	Under the No Action Alternative, existing soil resource trends would continue, and there would be no impacts to soil resources.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	The majority of undisturbed soils that would be disturbed by the Proposed Action are soil types with low erosion hazards, but disruption of vegetative cover and soil aggregates would result in a short-term increase in soil erosion and sediment transport. Overall erosion rates are expected to decrease as portions of the Proposed Action are reclaimed and vegetation cover is established. COPCs are not expected to be released from soils used for reclamation. Use of salvaged soils for GM is not expected to cause adverse impacts on plant selenium concentrations or downstream water quality. Estimated volumes of available GM indicate that sufficient soils are present within the area to be disturbed to meet cover requirements. No soils from outside disturbed areas would be needed for use as GM. Salvaged GM would be stored in stockpiles. During reclamation, any surplus GM beyond that required for minimum thickness of reclamation would either be placed to a thicker depth (other than cap-and-cover over backfill) or placed in stockpiles for later use. Overall effects to soils under the Proposed Action would be long-term and moderate, but much of the impact	Overall adverse effects to soils under the RCA would be less than under the Proposed Action and would be long-term and minor to moderate. As under the Proposed Action, much of the impact would reduce over time with the success of reclamation.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	would reduce over time with the success of reclamation.		
Vegetation, Riparian Areas, and Wetlands			
Upland Vegetation	Over the life of the mining activities, the Proposed Action would remove 399 acres of upland vegetation. Reclamation would eventually re-establish vegetation cover, but the species composition and community structure would be different. Overall impacts to vegetation would be minor and long-term.	Impacts to vegetation from the RCA would be similar to the Proposed Action. The RCA would remove 391 acres of upland vegetation. Reclamation would eventually re-establish vegetation cover, but the species composition and community structure would be different. Overall impacts to vegetation would be minor and long-term.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed and there would be no new impacts to vegetation.
Wetlands and Riparian Areas	The Proposed Action would remove 20.5 acres of wetlands and non-wetland WOUS. Most wetland impacts (17.5 acres) would occur in Category III wetlands. As a result of project design, use of BMPs, acreage, and similar functionality of wetlands not impacted in the assessment areas, the wetland impacts would be local, long-term, and moderate. Reclamation and establishment of new wetlands would eventually compensate for much of this loss. Potential impacts from COPCs in shallow alluvial aquifers may occur and would be long term and moderate.	The RCA would impact only 0.3 acre of wetlands. As in the Proposed Action, most wetland impacts would be to Category III wetlands. Under the RCA, there would be no measureable loading of selenium or other COPCs to wetlands and riparian areas. Wetlands impacts would be local, long-term, and minor.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed and there would be no new impacts to wetlands.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Noxious Weeds	There is a low occurrence of noxious weeds in the analysis area and BMPs would be implemented to minimize their potential spread. The effects of noxious weeds from the Proposed Action would be short-term and minor.	Noxious weed control methods for the RCA are unchanged from those presented in the Proposed Action. The RCA would disturb approximately 28 fewer acres than the Proposed Action. The effects of noxious weeds from the RCA would be short-term and minor.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed and there would be no new impacts from noxious weeds as a result of the undertaking.
Terrestrial Wildlife			
	The Proposed Action would have immediate direct effects to: wildlife mortality, disturbance, and displacement; and changes in wildlife behavior and composition associated with long-term changes in land cover. Overall, depending on the season and species, disturbance and displacement impacts to terrestrial wildlife would be long-term and negligible to minor. Wildlife may also be affected by exposure to selenium and other COPCs in vegetation and water in wetlands and riparian areas. Effects of selenium exposure from the Proposed Action would be long-term and negligible to minor. Indirect effects from habitat alteration would be localized and long-term. The Proposed Action would result in the loss of approximately 399 acres of forested and shrubland habitat and 20.5 acres of wetland and riparian habitat. Loss of aspen forest from the	The RCA would have impacts to terrestrial wildlife similar to the Proposed Action. The total acreage of upland wildlife habitat affected would be approximately 28 acres less than the Proposed Action. In addition, the RCA would disturb approximately 20.5 fewer wetland acres. The use of an existing haul road and backfill of overburden in a previously disturbed area would also consolidate new disturbance and result in less habitat loss and fragmentation than the Proposed Action. Overall, impacts to wildlife under the RCA would be reduced compared with the Proposed Action. Depending on the season and species, overall disturbance and displacement impacts would be long-term and range from negligible to minor.	Under the No Action Alternative, the Rasmussen Valley Lease would not be developed and there would be no new impacts to wildlife from the proposed mining.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Proposed Action would be long-term and major. This would be a long-term and major effect on the habitats of many terrestrial wildlife species.		
Fisheries and Aquatic Resources			
Aquatic habitat	The Proposed Action would result in direct impact to 20.5 acres of wetland habitat and would also impact stream channels in the Study Area. There would also be indirect impact to aquatic habitats within and adjacent to the Study Area. Clearing of vegetation in the Study Area could contribute to increased soil erosion, and sediment loading in local drainages if not controlled with BMPs. This could result in altered stream morphology, choking out of aquatic plants, and changes in fish and aquatic invertebrate communities. BMPs for sedimentation and capturing of surface runoff during mining would decrease the severity or eliminate of these potential impacts. However, the reduced quantity of water resulting from capture of runoff could also result in the drying of some aquatic habitats downstream of the Proposed Action. The Proposed Action would impact 80 acres of AIZ, which could result in increased water temperatures, decreases in natural sediment filtration, changes in channel morphology, loss of instream wood recruitment, and decrease in inputs of	The RCA would impact 20 fewer acres of wetland habitat than the Proposed Action. The majority of RCA disturbance would occur in upland habitats. The RCA would also impact 69 fewer acres of AIZ than the Proposed Action. Overall impacts to aquatic resources would be negligible and long-term under the RCA. The RCA was developed to avoid most impacts to aquatic resources. Overall impacts to aquatic habitats would be negligible under the RCA.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to aquatic habitat above the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	organic matter as energy. Overall effects of the Proposed Action to aquatic habitat would be long-term and moderate.		
Macroinvertebrates	Macroinvertebrates would be impacted by changes in sedimentation and changes to AIZs resulting from the Proposed Action. These impacts would change the physical characteristics of the aquatic environment. Changes in the macroinvertebrate community may include temporary increases in the abundance of some species and decreases in the abundance of other species less tolerant of changes in turbidity. Macroinvertebrate community composition is also impacted by removal of vegetation in the AIZ. Overall impacts of the Proposed Action to macroinvertebrates would be long-term and minor.	Impacts to macroinvertebrates under the RCA would be less than the Proposed Action. Macroinvertebrates may be affected by sedimentation and changes to the AIZ. There would be only 11 acres of impact to the AIZ under the RCA compared to 86 under the Proposed Action. The RCA would also have a lower potential to contribute selenium and other COPCs to surface water. Overall the impacts of the RCA on macroinvertebrates would be negligible in wetlands and waters downstream of the RCA.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to macroinvertebrates above the existing conditions.
Fish	Culverts would be designed so that the minimum depth of water for fish passage is always available. BMPs and design features would be implemented to minimize sedimentation. The Proposed Action is unlikely to contribute to population level effects of selenium and other COPCs on fish downstream of the Study Area. Overall impacts of the Proposed	The RCA does not include any crossings of fish-bearing streams. The RCA would comply with BLM and USFS guidelines for the maintenance of instream flows and would not fragment fish habitat. The potential for the bioaccumulation of selenium and other COPCs in the aquatic food chain would be less under the RCA. Overall, the RCA would have a negligible impact on fish	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to fish habitat above the existing conditions.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Action to fish would be long-term and moderate.	populations in wetlands and waters downstream of the Study Area.	
Amphibians and Reptiles	Direct mortality of amphibians and reptiles may occur in wetland, riparian and stream habitats disturbed by the Proposed Action, including 20.5 acres of wetland and riparian areas. In addition, direct mortalities may occur on haul roads when individuals move between wetland habitats. Amphibians are also susceptible to selenium toxicity and to the effects of other COPCs. Overall impacts of the Proposed Action to amphibians and reptiles would be long-term and moderate.	Most wetland, riparian and aquatic habitat would be avoided under the RCA. Consequently, impacts on amphibians and reptiles from the RCA would be negligible.	Under the No Action Alternative, the Rasmussen Valley Lease would not be mined and there would be no effects to amphibians and reptiles above the existing conditions.
Threatened, Endangered and Special Status Species			
	Threatened, endangered, or sensitive species include threatened, endangered, and proposed candidate species; Caribou National Forest (CNF) sensitive species and management indicator species and BLM sensitive species; and special status plants. Threatened, endangered, and proposed candidate species that may occur in the analysis area are Canada lynx and greater sage-grouse. Sensitive species and management indicator species that may occur in the analysis area are gray wolf, wolverine, Townsend's big-eared bat, special status raptor species, Columbian sharp-tailed grouse, small birds, special status	Under the RCA, there would be a loss of 103 acres of marginal aspen forest foraging habitat, 20 acres more than under the Proposed Action. This would make these marginal areas less attractive to Canada lynx, gray wolf and wolverine, but would not result in mortality or loss of important habitat. A greater loss of sagebrush shrubland under the RCA would result in displacement of individuals, marginal habitat loss, and habitat fragmentation, making the Study Area unattractive for greater sage-grouse and	Under the No Action Alternative, the federal phosphate leases would not be developed. The No Action Alternative would result in no new impacts in the Study Area.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	migratory and water birds, special status reptiles and amphibians, and special status fish. There are no identified threatened, endangered, and proposed candidate species plant species, CNF sensitive plant species, CNF Forest Watch rare plant species, or BLM sensitive plant species in the analysis area. Canada lynx, gray wolf, wolverine, greater sage-grouse, and Columbian sharp-tailed grouse may range into the analysis area or may occur in limited numbers. In general, the habitat in the analysis area is marginal for these species. Wide-ranging species like the Canada lynx, gray wolf, and wolverine would avoid these marginal habitats. The greatest effects to these species would be from the loss of 83 acres of marginal aspen forest foraging habitat under the Proposed Action. Given the marginal and patchy nature of marginally suitable habitat and the large foraging range of these species, adverse impacts would be negligible. Greater sage-grouse and Columbian sharp-tailed grouse have been observed sporadically in the analysis area. The existing sagebrush communities do not provide optimum habitat for either grouse species. Townsend's big-eared bats may	Columbian sharp-tailed grouse. The RCA would impact 20 acres less wetland foraging habitat for the Townsend's big-eared bat than the Proposed Action. Other impacts to the species would be similar to the Proposed Action. In general, impacts of the RCA to special status raptor species and small birds would be similar to the Proposed Action. The RCA would result in long-term loss of 34 acres of aspen forest, 20 acres more than the Proposed Action. On the other hand, the RCA would result in disturbance to 20 acres less wetland and riparian habitat. Overall impacts would be negligible and long-term. The RCA would have the same types of impacts to special status fish, reptiles and amphibians, and migratory and water birds as the Proposed Action, but they would be reduced because of the reduced impacts to wetland habitats and improved protection of downstream water quality. Overall impacts to special status water birds would be negligible and long-term. Overall impacts of the RCA on threatened, endangered and special status species would be	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	occupy a variety of the habitats in the Study Area. The Proposed Action would result in long-term alteration of about 419 acres of upland woodland, and wetland foraging habitat. Overall impacts would be minor and long-term. Special status raptors and small birds would be affected principally by disturbance to upland woodlands and shrubland habitat. These habitats are important for both nesting and foraging. These species also use wetland habitat for foraging. There would be long-term loss of foraging and nesting habitat for special status raptor species and small birds. Noise and human disturbance would temporarily displace the raptors. The Proposed Action would result in permanent loss of 83 acres of aspen habitat and 20.5 acres of wetland and riparian habitat. On a landscape scale, these impacts would be minor. Special status fish, reptiles and amphibians, and migratory and water birds are more heavily dependent on wetlands and riparian areas. These species would be directly affected by the loss or degradation of wetland habitat and are also more susceptible to potential exposure to selenium and other COPCs. The Proposed Action would result in the loss of 20.5 acres of wetland and riparian habitat.	less than the Proposed Action, but similar in nature. The overall impact of the RCA on threatened, endangered and special status species would be long-term and negligible to minor.	

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	Impacts to these species under the Proposed Action would be moderate and long-term. Overall impacts to threatened and special status species from the Proposed Action would be negligible to long-term and moderate.		
Special Status Plant Species	There are no identified TEPC plant species, CNF sensitive plant species, CNF Forest Watch rare plant species, or BLM sensitive plant species in the Study Area.	There are no special status plant species in the Study Area.	There are no special status plant species in the Study Area.
Visual Resources			
	Under the Proposed Action impacts to visual resources would include alterations of the existing visual landscape by project components. These components would contrast with the existing visual landscape character, and would remain with somewhat less contrast after reclamation. However views of the Study Area are limited by the surrounding terrain. The area is viewed by comparatively few people for limited periods of time. The modifications would meet both the USFS Visual Quality Objectives (VQO) of modification and the BLM Visual Resource Management (VRM) objectives for the area. Overall, the impacts of the Proposed Action to scenic attractiveness would be long-term and minor.	Under the RCA there would be no overburden piles on the downslope side of the mine pit and the GM stockpiles in that area would be transient. Although the overall mine pit of the RCA would be slightly larger than in the Proposed Action, the individual pit phases, and associated stockpiles would be less noticeable than those of the Proposed Action. As in the Proposed Action, the landscape modifications would meet both the USFS VQO of modification and the BLM VRM management objectives for the area. The overall impacts of the RCA to scenic attractiveness would be negligible.	Under the No Action Alternative, the mine would not be developed and there would be no new impacts to visual resources

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
Land Use, Access and Transportation			
Grazing	The Proposed Action would render total of 967 acres of the Rasmussen Valley Cattle Allotment (RVCA) unusable for grazing, including almost all of Unit 3A in the Study Area. Although impacts to some grazing units would be major, impacts to the RVCA as a whole would be minor, because the grazing lands would not be displaced all at once, but progressively as mining activities progress, and thus portions of the grazing lands within the Study Area may remain accessible during mining activities. In contrast, only about 9 acres of the Henry Olsen Sheep and Goat Allotment (HOSGA) would be unusable. This is about 0.08 percent of the allotment. The impact to the HOSGA would be negligible. When areas are reclaimed, the vegetation in the early stages of reclamation may be more favorable for forage production than the pre-mine vegetation, although the species diversity would be limited. Overall impacts of the Proposed Action to grazing would be negligible to long-term and minor.	Impacts to grazing under the RCA would be equivalent to those under the Proposed Action. The additional acreage to be mined and the slight changes in access would not alter the effects of the RCA in comparison to the Proposed Action. The changes to acreage to be mined and sequence of mining would have little if any additional effect on land available for grazing in comparison to the Proposed Action. The overall impacts of the RCA on grazing would be long-term and minor.	Under the No Action Alternative, the mine would not be developed. There would be no impact to the availability or quality of grazing.
Traffic	Under the Proposed Action, workforce and equipment currently being used at the Rasmussen Ridge Mines would	Effects to traffic under the RCA would be would be equivalent to those under the Proposed Action	Under the No Action Alternative, the mine would not be developed and there would be a reduction of

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	transition to the Proposed Action. This continuation of activities equivalent to existing activities would result in little or no change to workforce or traffic. No impacts to traffic or motorist safety are anticipated under the Proposed Action. Consequently the impacts on traffic from the Proposed Action would be negligible.	Overall impacts on traffic from the RCA would be in slightly different locations than the Proposed Action, but would also be negligible.	traffic on public roadways.
Recreation	Approximately 1,008 acres of federal lands and 833 acres of state lands open for recreation are included in the Proposed Action. Of that, approximately 410 acres are located in the Blackfoot River WMA. Given the industrial nature of the Proposed Action, it is conservatively assumed that recreation either would be prohibited on these lands during the duration of the Proposed Action, or that recreationists would not choose to utilize these lands. The acreage of lands available for recreation that would be reduced under the Proposed Action is negligible at the local and regional scales given the large acreage that would remain available. The Proposed Action does not include any developed recreational facilities in the Study Area. There are sections of some designated trails that would be lost from use. Overall, the impacts of the Proposed Action to recreation would be long-term, moderate, and	The RCA would have similar effects to wildlife as those described under the Proposed Acton. Consequently, impacts to hunting and other upland wildlife related recreation would be the same. The effects of the RCA to wetlands would be less than the Proposed Action and would have less effect on aquatic species including game fish. Overall the impacts of the RCA to recreation, like those of the Proposed Action would be long-term, moderate and site-specific, but negligible at the local and regional scales.	Under the No Action Alternative, the mine would not be developed. There would be no new impacts to recreation or recreationists.

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	site-specific, but negligible at the local and regional scales.		
Cultural Resources			
	No historic properties were identified in the area of potential effects (APE) of the Proposed Action. The Proposed Action would have no effect on known historic properties. If cultural resources are discovered during mine operation, they would be avoided and evaluated and, if necessary, a treatment plan would be developed and implemented. Effects of the Proposed Action to cultural resources would be negligible.	No historic properties were identified in the APE of the RCA. If cultural resources are discovered during mine operation, they would be avoided and evaluated and, if necessary, a treatment plan would be developed and implemented. Effects of the RCA to cultural resources would be negligible.	Under the No Action Alternative, the mine would not be developed. There would be no effect to historic properties as a result of the No Action Alternative.
Tribal Treaty Rights and Interests			
	Agency consultation with the Shoshone-Bannock Tribes has been ongoing. To date the Tribes have not identified any treaty rights, interests, or traditional concerns such as sacred sites that may be affected by the Proposed Action. Effects of the Proposed Action to known treaty rights and interests would be negligible. Overall impacts to traditional resources would be long-term and minor.	Effects of the RCA on Tribal treaty rights and interest would be the same as the Proposed Action. Adverse effects to tribal treaty rights, interests or traditional concerns have not been identified for the RCA. Overall impacts to traditional resources would be long-term and minor.	The No Action Alternative would have no effect on Tribal treaty rights and interests.
Social and Economic Conditions			
	The Proposed Action would take effect during the shutdown of the Rasmussen Ridge Mines. The existing work force and associated services would transfer to the new mine. Effects to population, housing, community services, employment,	Effects of the RCA to Social and Economic conditions would be the same as the Proposed Action. Overall favorable impacts of the RCA on social and economic conditions would be short-term	Under the No Action Alternative the mine would not be developed. There would be major effects to employment, income to local and regional businesses, taxes and other revenues, and property values in Caribou County and

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	income to local and regional businesses, taxes and other revenues, and property values would be negligible. Effects to tourism and recreation from restricted access to mine property during operations would also be negligible. Overall favorable impacts of the Proposed Action to social and economic conditions would be short-term and major.	and major.	lesser effects in neighboring counties. There would also be moderate effects to population and housing resulting from unemployment. Overall impacts of the No Action Alternative to social and economic conditions would be adverse, long-term and major.
Environmental Justice			
	There are no communities in the vicinity of the Proposed Action that are minority as a whole, and none would be exposed to high and adverse environmental effects. Because The Shoshone-Bannock Tribes of the Fort Hall Reservation, approximately 30 miles from the Study Area, have treaty rights and interests in public lands in the region, the Proposed Action could have disproportionate impacts on the population of the Reservation. These potential effects are addressed in Tribal Treaty Rights and Interests. Impacts of the Proposed Action to the Shoshone-Bannock Tribe would be long-term and minor. Impacts to remaining populations utilizing the analysis area would be negligible.	The environmental justice effects of the RCA would be the same as the Proposed Action. Like the Proposed Action, impacts of the RCA to the Shoshone-Bannock Tribe would be long-term and minor. Impacts to remaining populations utilizing the Study Area would be negligible.	Under the No Action Alternative, the mine would not be developed and there would be no new environmental justice effects.
Hazardous Materials and Solid Waste			
	Appropriate BMPs, storage and secondary containment would be used for all hazardous materials and	The RCA storage area for fuels and hazardous materials would be at the existing Rasmussen Ridge	Under the No Action Alternative the proposed mine would not be developed and there would be no

Table 2.9-1 Alternative Comparison and Effects Summary

Resource	Proposed Action	RCA	No Action Alternative
	wastes, similar to those used at the Rasmussen Ridge mines. In the event of any inadvertent spills or releases, Agrium would implement its SPCC Program. Effects of the Proposed Action on hazardous materials and wastes would be negligible. Under the Proposed Action, there would be little or no net increase in the quantities of materials used or wastes generated relative to what is currently managed at the Rasmussen Ridge Mines.	Mine shop. Management practices for fuels, hazardous materials and wastes would continue in the same manner as currently implemented at the Rasmussen Ridge Mines. As in the Proposed Action, effects associated with fuels, hazardous materials and wastes would be negligible. Overall impacts of the RCA would be negligible. Under the RCA, there would be little or no net increase in the quantities of materials used or wastes generated relative to what is currently managed at the Rasmussen Ridge Mines.	new effects associated with fuels, hazardous materials and wastes.
Public Health and Safety			
	The Proposed Action has the potential to impact surface waters by introducing pollutants, such as sediment, selenium, and other COPCs, and to restrict access by the public, livestock, and wildlife. However, no adverse effects to public health and safety are anticipated to occur from implementation of the Proposed Action. The impacts of the Proposed Action to public health would be negligible.	Under the RCA, potential impacts to public health and safety would be similar to those described for the Proposed Action; however, this alternative would have less potential for selenium and other COPCs to be released to surface water or to bioaccumulate in the aquatic food chain. No adverse effects to public health and safety are anticipated to occur from implementation of the RCA. The impacts of the RCA to public health and safety would be negligible.	Under the No Action Alternative, the facilities would not be constructed or operated; therefore, there would be no project-related impacts to public health and safety.

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